

Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

aTC425
.P6U5

POTOMAC RIVER SUBWATERSHED

of the Potomac River Watershed

Hardy County, West Virginia



ENVIROMENTAL IMPACT STATEMENT



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MORGANTOWN, WEST VIRGINIA
OCTOBER 1974

NATIONAL

A
G
R
I
C
U
L
T
U
R
A
L



LIBRARY

The scene of
The major part
This photo

Lost River Valley.
agricultural lands.

Upper Cove Lost River. One of
the five flood prevention structures in the watershed project will be built
on this tributary above Mathias and will protect the town.

TOP PHOTO, BACK COVER

The wide, verdant Lost River Valley has picturesque mountains on both
sides, creating a magnificent setting. The scene is near Baker. George
Washington National Forest lies east of the river.

BOTTOM PHOTO, BACK COVER

The watershed project will protect these residences along Lost River at
Lost City. The flood prevention dam nearest Lost City will be enlarged
to hold 50 acres of water for recreation, including camping and swimming.

JTC425
-P6115

USDA-SCS-EIS-FP-(ADM)-74-20-(F)-W.VA.

LOST RIVER SUBWATERSHED OF THE
POTOMAC RIVER WATERSHED
HARDY COUNTY, WEST VIRGINIA

Final Environmental Impact Statement

James S. Bennett
State Conservationist
Soil Conservation Service

Sponsoring Local Organizations:

County Court of Hardy County
Moorefield, West Virginia 26836

Potomac Valley Soil Conservation District
P. O. Box 548
Romney West Virginia 26757

October 1974

JUN 19 1975

U. S. DEPT. OF AGRICULTURE

CANCELLED PREP

Prepared By

U. S. DEPARTMENT OF AGRICULTURE

Soil Conservation Service
P. O. Box 865
Morgantown, West Virginia 26505

USDA ENVIRONMENTAL IMPACT STATEMENT

LOST RIVER SUBWATERSHED OF THE POTOMAC RIVER WATERSHED HARDY COUNTY, WEST VIRGINIA

Prepared in Accordance with
Sec. 102 (2) (c) of P.L. 91-190

Summary

- I. Final
- II. Soil Conservation Service, United States Department of Agriculture
- III. Administrative
- IV. Project Purpose

A watershed protection and flood prevention project located in Hardy County, West Virginia, to be carried out by Sponsoring Local Organizations with federal assistance under the provisions of Public Law 534. The project will consist of conservation land treatment measures on 94,750 acres, four single-purpose floodwater retarding structures, and one multiple-purpose structure providing storage capacity for floodwater and recreation.

V. Summary of Environmental Impacts

Floodwater and sediment damages will be reduced by about 88 percent and allow for more efficient and effective use of 476 acres of flood plain land. Sediment yield of the watershed will be reduced by 12,100 tons annually, which will reduce downstream sediment damages to metropolitan water supply, navigation, dredging, boating, commercial fishing, and aesthetics of the Potomac River and estuary. Installation of a 50-acre lake and recreation development will provide an estimated 105,750 annual recreation visits, but will create increased traffic, noise, and litter. Land treatment will reduce erosion, conserve soil moisture, improve wildlife habitat and enhance aesthetics of the watershed. Rural economy will be stimulated by allowing more effective use of agricultural lands, eliminating market delays, and creating 100 man-years of employment and five permanent jobs. In creating 167 acres of warm-water fishing and waterfowl habitat, 2.4 miles of stream and 292 acres of farmland and associated wildlife habitat will be inundated. Installation of structures will require the relocation of 11 residences and associated improvements. Construction activities will cause temporary increases in sediment and turbidity of streams. Fishery resources will be improved by reducing the need for annual stream repair work.

VI. Alternatives Considered

(1) Land treatment only, (2) land treatment, floodproofing, and flood insurance, (3) land treatment and recreation, (4) land treatment, stream channel modification and diking, (5) land treatment, structural measures and recreation, and (6) a continuation of present level of use with no project action.

VII. Written comments have been received from the following agencies and organizations:

Department of the Army
Department of Commerce
Department of the Interior
Department of Transportation
Environmental Protection Agency
Advisory Council on Historic Preservation
State Soil Conservation Committee
West Virginia Department of Natural Resources

VIII. Draft Statement transmitted to the Council on Environmental Quality on December 18, 1973.

TABLE OF CONTENTS

	<u>Page</u>
TITLE OF STATEMENT	1
SPONSORING LOCAL ORGANIZATIONS	1
PROJECT OBJECTIVES AND PURPOSES	1
PLANNED PROJECT	4
Land Treatment	4
Structural Measures	7
Land Use Changes	12
OPERATION AND MAINTENANCE	14
Land Treatment	14
Structural Measures	14
Project Costs	17
ENVIRONMENTAL SETTING	18
Physical Resources	18
Fish and Wildlife Resources	25
Economic Resources	29
Recreation Resources	31
Archeological and Historical Resources	33
Soil, Water, and Plant Management Status	33
WATER AND RELATED LAND RESOURCE PROBLEMS	34
Land Treatment Problems	34
Floodwater Damage	34
Erosion Damage	38
Sediment Damage	38
Recreation Problems	40
Fish and Wildlife Resource Problems	41
Economic and Social Problems	42
Other Problems	42
ENVIRONMENTAL IMPACTS	43
Conservation Land Treatment	43
Structural Measures	43
Economic and Social	48

TABLE OF CONTENTS (Continued)

	<u>Page</u>
FAVORABLE ENVIRONMENTAL IMPACTS	49
ADVERSE ENVIRONMENTAL EFFECTS	50
ALTERNATIVES	51
Nonstructural	51
Structural	53
Flood Plain Purchase	55
No Project	55
SHORT-TERM vs. LONG-TERM USE OF RESOURCES	57
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES	60
CONSULTATION WITH APPROPRIATE FEDERAL AGENCIES AND REVIEW BY STATE AND LOCAL AGENCIES DEVELOPING AND ENFORCING ENVIRONMENTAL STANDARDS	61
LIST OF APPENDICES	90
Appendix A - Structure Data (one page)	
Appendix B - Comparison of Benefits and Costs for Structural Measures (one page)	
Appendix C - Letters of Comment Received (18 pages)	
Appendix D - Bibliography of Reference Sources (one page)	
Appendix E - Public Meetings (four pages)	
Appendix F - Project Map	

USDA SOIL CONSERVATION SERVICE
FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR

Lost River Subwatershed of the Potomac River Watershed
Hardy County, West Virginia

Installation of this project constitutes an administrative action.
Federal assistance through Public Law 534, 78th Congress,
49 Stat. 1578, as amended.

SPONSORING LOCAL ORGANIZATIONS

County Court of Hardy County
Potomac Valley Soil Conservation District

PROJECT OBJECTIVES AND PURPOSES

The Sponsoring Local Organizations and the Service agreed that a project would be formulated to meet the following objectives:

1. Management and development of soil and water conservation practices will be stressed throughout the project area during the installation period. Future land use adjustments will be made that will include both urban and agricultural land, renovating old and establishing new conservation practices where needed, and improving the economic conditions of low income-producing areas.
2. Flood damage protection will be provided to the agricultural lands along the main stem of Lost River and as far upstream on each major tributary as can be economically justified. Protection will be provided from the 5-year to 10-year frequency flood event.
3. Reduction in sediment and scour damage to agricultural lands and stream channels within the watershed will be provided. Objectives will be to reduce this type of damage by 50 percent.
4. Reduction of floodwater damage to roads and bridges will be stressed. Protection will be provided to assure that major highways are open to safe travel during the 100-year frequency flood event.

5. Preservation and improvement of existing fish and game resources will be emphasized when assisting landowners in developing and installing a conservation plan and while coordinating the project measures with the West Virginia Department of Natural Resources and the U. S. Fish and Wildlife Service.

6. Increase the opportunities for public recreation and fish and wildlife resources in the watershed by providing a multiple-purpose recreational lake and associated developments for fishing, boating, camping, picnicking and swimming.

The water and related land resource problems and recreational needs identified in the watershed have been recognized in the following major studies:

1. Potomac River Basin Report - 1963, printed in 1970 as House Document No. 91-343 in Four Volumes.
Volume III, Appendix F - Report on the Water and Related Land Resources in the Potomac River Basin Studies on page 3, "The upstream area in the Potomac River Basin was delineated into 77 subwatershed areas. Upstream structural works of improvement are needed and feasible in 61 subwatersheds . . ."
Lost River is listed as a needed and feasible subwatershed in Table 21 on page 18.
2. Report for Development of Water Resources in Appalachia - December 1969 in 24 Volumes.
Main Report, Part 1, Summary Report. In the Plan for Appalachian West Virginia, under the Recommended Plan of Development or Development Studies, Lost River is listed as one of the watershed projects for flood control in the Potomac River Basin (page I-6-118).
Appendix A, Agriculture Forestry and Conservation. "The recommended planned program for structural measures include planning and installation of the following measure: plan and install 198 feasible upstream watersheds. Lost River is listed as one of the 198 recommended watersheds in Table XLV, page A-334. On page A-164, the level of local Sponsors' interest is listed as high for Lost River.
Appendix G, Fish and Wildlife Resources. " . . . West Virginia along with designated portions of Pennsylvania and Ohio currently have the greatest need for additional fishing opportunity." (Page G-51.) "Planned water developments in West Virginia will improve the overall fishing opportunity between 1964 and 1980, but only 58 percent of the total demand is expected to be fulfilled after this sixteen year period. . ." (Page G-71.) Table III on page G-87 indicates that in water area B-3, which includes Lost River, only 79.8 percent of the demand for fishing opportunity will be fulfilled in 1980.

3. The National Inventory of Soil and Water Conservation Needs for West Virginia, updated in 1970.
Provides the following information: Hardy County contains 374,400 acres; Conservation Needs were inventoried on 322,285 acres. Land needing treatment includes 11,366 acres of cropland, 38,512 acres of pasture, 130,000 acres of forest, and 105 acres of other land. A change in land use is needed on 8,288 acres of pasture. The total acreage in Hardy County needing conservation treatment is 179,983 acres. (Tables A, G, H, I, L, and N.)
4. North Atlantic Regional Water Resources Study - June 1972.
Appendix F, Upstream Flood Prevention and Water Management, Lost River is located in Subregion F - Area 19. "Of the 79 small watersheds in Area 19, 35 appear to warrant structural measures with flood prevention as a primary use . . ." (Page F-8.) On Figure F-24, Lost River is indicated as a Potential Flood Prevention Project and is included in the 35 Potential Flood Prevention Projects for Area-19 listed on Table F-19.
5. Statewide Comprehensive Outdoor Recreation Plan (SCORP) -
The demand for recreation opportunities in Region VI is projected to be over 4.5 million recreation days by the year 2000. Present and future planned developments will not be able to accommodate this demand.

PLANNED PROJECT

Lost River Subwatershed is located in the eastern panhandle of West Virginia along the Virginia border. Its drainage area of 183 square miles, or 117,120 acres, is confined to Hardy County, West Virginia. It includes all the drainage area of Lost River from its headwaters to its junction with Trout Run just west of Wardensville.

To meet the Sponsors' objectives, a watershed protection and flood prevention project is planned and will be carried out by Sponsoring Local Organizations with federal assistance under the provisions of Public Law 534. The project will consist of conservation land treatment measures on 94,750 acres, four single-purpose floodwater retarding structures, and one multiple-purpose structure providing storage capacity for floodwater and recreation.

Land Treatment

There are 393 farms or land ownerships in the watershed; 337 are cooperating with the Potomac Valley Soil Conservation District. These cooperators during the past 20 years have applied conservation land treatment measures to cropland, grassland, and forest land at the rate of 850 acres per year. The land treatment plan calls for the acceleration of this rate to about 1,150 acres per year. This is in addition to the continuing fire and pest control programs on 86,300 acres of forest land in the watershed.

To achieve adequate land treatment within the scope of project objectives, 94,750 acres of watershed land will be treated. This includes 1,400 acres of cropland, 7,000 acres of grassland, 86,300 acres of forest land, 25 acres of miscellaneous land, and 25 acres of critical area stabilization.* (1)

* All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigation by the Soil Conservation Service, U. S. Department of Agriculture.

(1) See bibliographical appendix for source reference.

Cropland Measures: Land treatment measures are needed on 1,400 acres of cropland in the watershed to protect the soil, reduce erosion, maintain high crop yields, maintain soil fertility and use land within its capabilities. Conservation measures that will be applied to watershed cropland include: conservation cropping systems, minimum tillage, subsurface tile drainage, grass waterways, and crop residue management. An example conservation cropping system would include a fertilization program based on soil analysis and a crop rotation system that might include two years of corn followed by a cover crop of wheat and three years of hay.

Grassland Measures: Conservation measures that will be applied to 7,000 acres of watershed grassland include: pasture and hayland planting, pasture and hayland management, farm pond construction, spring development, and brush control. An example of pasture management in the watershed should include soil testing to determine lime and fertilizer needs, rotation grazing system to alternately graze and rest separate pasture to provide maximum forage growth and reduce erosion resulting from overgrazing, mechanical brush control, and livestock water supply development.

Forest Land Measures: Forest land practices on private land will include tree plantings, hydrologic stand improvement, woodland grazing control, skid trail and logging road erosion control, fire protection, and forest land management. The existing program of the U. S. Forest Service on National Forest System Lands, which includes erosion control, reforestation, silvicultural treatments, fire control, and resource development, will be continued at the same rate. In addition, the following practices will be installed by the U. S. Forest Service on National Forest Land under the accelerated program: rehabilitation of 13 miles of abandoned roads and trails, 1/2 mile of gully control, and 5 miles of stream-bank stabilization, 11 miles of stream channel clearance, and 100 acres of sheet erosion control.

Miscellaneous Land Measures: Conservation land treatment practices such as recreation area improvement, wildlife habitat management, diversions, tree planting, subsurface tile drains, and land grading and shaping are planned for application of 25 acres of residential, idle or recreation land.

Critical Area Stabilization: Ten acres of critically eroding roadbanks and 15 acres of pastureland gullies will be stabilized by shaping and revegetation with grasses and legumes.

These measures on private land will be installed by individual landowners or operators uniformly over the 8 year installation period. The U. S. Forest Service will install the land treatment measures in the George Washington National Forest.

The Potomac Valley Soil Conservation District, in accordance with their long-range plan and objectives, has the responsibility for coordinating the land treatment program within its boundary. The district will assume a leadership role for installation of planned land treatment measures within the project period.

Technical assistance for soil surveys and planning and installing the needed land treatment measures on private land will be provided district cooperators by the Soil Conservation Service and the West Virginia Department of Natural Resources, Division of Forestry, in cooperation with the Forest Service, through the Potomac Valley Soil Conservation District. The Soil Conservation Service will develop inventories and make recommendations concerning the use of soil, water, fish and wildlife and recreation resources. They will also provide technical and consultive assistance necessary to record land use decisions and plan and establish the measures associated with erosion control, drainage, and water disposal.

Basic resource conservation plans will be developed for approximately 50 soil conservation district cooperators. This includes 30 plans under the ongoing program and 20 under the accelerated effort. An additional 50 conservation plans will be revised, with 45 of these under the accelerated program and 5 under the existing program. In addition, 90 individual forest management plans will be prepared for landowners.

The West Virginia Department of Natural Resources, Division of Forestry, in cooperation with the Forest Service, will make forest inventories and develop recommendations concerning multiple-use management of all forest resources.

The Potomac Valley Soil Conservation District will be responsible for stabilizing approximately 10 acres of critically eroding roadbanks. The district, through arrangements with the West Virginia Department of Highways, will provide equipment and labor.

Structural Measures

Four single-purpose floodwater retarding structures, and one multiple-purpose structure providing storage capacity for floodwater and recreation are planned for this watershed to meet Sponsors' objectives. The completed project will control floodwaters from 35 percent (64.75 square miles) of the total watershed area. Location of each of the structures is shown on the project map, Appendix F.

All of the structural measures are planned as earth and rock fill dams. The dams are designed to provide temporary storage of runoff upstream and then release the water at a rate which will minimize downstream flooding. Flow will be controlled through ungated, self-operating reinforced concrete conduits, which incorporate a two-stage principal spillway system that automatically controls runoff resulting from all storms up to the 100-year frequency flood event. Flow resulting from storms greater than the 100-year frequency event will be routed safely around the dams through the emergency spillways. The emergency spillways will be excavated into rock (sandstone or shale), and flood flows will pass through at acceptable velocities.

Total flow from each of the reservoirs will approximately equal the inflow with small portions being lost to evaporation. Normal flow volumes and low flows will pass through the reservoirs with insignificant evaporation losses. Flood flows will be stored in the flood pools and released with no significant change in volume within 2 to 6 days following the storm.

Each dam was planned with a storage allowance for sediment that is anticipated to accumulate over the useful life of the structure. This will create a sediment pool above each structure ranging in size from 6.5 acres at Structure No. 27 to approximately 70 acres at Structure No. 4. For more detail involving structural measures, see Appendix A.

The design life of the planned structures is 100 years. The capacity reserved for expected sediment accumulation will have been expended by the end of 100 years. Assuming proper maintenance of the dam and spillways during the first 100 years and thereafter, the capacity provided for floodwater detention and recreation will diminish as sediment accumulated past the 100-year life.

Clearing during construction will be limited to the dam, spillway, borrow, permanent impoundment and recreation facility areas. These areas will be revegetated with adapted grasses, legumes, trees or shrubs, with species selected in consultation with the West Virginia Department of Natural Resources for wildlife habitat values.

During construction, appropriate measures will be taken to minimize soil erosion and water and air pollution. These measures will be determined on a site-by-site basis with plans and specifications prepared for each watershed structure. Such measures will include: watering haul roads and earth fill to suppress dust; reducing to the greatest extent practical the duration of exposure of highly erodeable soils, temporary vegetation or mulching of exposed areas; debris basins to trap sediment; construction of temporary bridges where frequent stream crossing is necessary; and burial of unsalvageable woody materials removed from construction sites. Dams, borrow areas, and emergency spillways will be planted with grasses and legumes and annually maintained to provide soil protection, aesthetic beauty, and wildlife habitat.

Although all practical measures will be taken to minimize soil erosion, it is recognized that some sediment will leave the construction sites. The following assumptions were made based on past construction experience; unprotected disturbed areas will be limited to two acres per site at any given time; debris basins will prevent all sand-size or larger material from leaving the site. Sediment leaving the site will be suspended sediment and will cause turbidity in receiving waters, but will not be expected to deposit in a flowing stream.

The following table was developed using the proposed order of installation as shown in the work plan and estimating a two year construction period for Structures Nos. 27, 10 and 23, and three years for Structures Nos. 4 and 16:

ANNUAL SEDIMENT YIELD FROM CONSTRUCTION SITES

First Year		None
Second Year	Structure No. 27	40 tons
Third Year	Structure No. 27 & Structure No. 10	80 tons
Fourth Year	Structure No. 16 & Structure No. 10	80 tons
Fifth Year	Structure No. 16	40 tons
Sixth Year	Structure No. 16 & Structure No. 23.	80 tons
Seventh Year	Structure No. 4 & Structure No. 23	80 tons
Eighth Year	Structure No. 4	40 tons
Ninth Year	Structure No. 4	40 tons

The average yield of sediment due to construction of 60 tons per year represents about 0.18 percent of the present annual sediment yield of Lost River Watershed.

The watershed Work Plan has been coordinated with the West Virginia Antiquities Commission and the Archeology Section of the West Virginia Economic and Geologic Survey. Investigations indicate that installation of the project will not encroach on any known archeological values or any historical site. If artifacts or other items of archeological or historical significance are uncovered before and during construction, construction will not begin or continue until the Director of West Virginia Department of Archives and History and the National Park Service are notified, and a course of action agreed to between the Sponsors, the Service, and responsible agencies is implemented. Should detailed investigation, salvage, or mitigation be necessary, appropriate arrangements will be made between the Sponsors, Soil Conservation Service, and U. S. Department of the Interior, National Park Service. Provisions of the Reservoir Salvage Act will be followed.

Installation of structural measures will require the removal or relocation of 11 homes, 5 miles of road, and 10 miles of electric and telephone lines. A small cemetery located within the flood pool area of site 4 about 1,700 feet above the dam will have to be moved prior to installation of this structure. A large gas line in the upper region of site 27 flood pool will be inundated on a frequency of once every 50 years and will be weighted for protection during large floods.

The recreation development at Structure No. 16 is planned for both day and overnight use. Activities are planned at three major use areas.

Tent and trailer camping is provided in an area located on the south side of the lake. Each site will consist of a parking spur, picnic table, fireplace or grill, garbage can and rack, and tent pad. One sanitary dump station to serve the area is also planned. Drinking water and sanitary facilities will be provided by two buildings located on each side of the camping area. This area will accommodate about 280 people at one time and has adequate space available in adjacent areas for future expansion if needed. An open play area is also provided near the campgrounds for group activities and as a playground for small children. Playground apparatus will be provided. Access to the campground will be by a two-lane, 20-foot blacktop road to be constructed across the top of the dam. A one-lane, 12-foot gravel road will provide access within the area.

Two picnic areas will provide space for day-use visitors. One area that will accommodate about 300 people is located on a level terrace between the lake and overnight camping areas. Access will be provided by a two-lane, 20-foot blacktop access road with some one-lane, 12-foot gravel roads within the picnic areas. One large picnic shelter having

a fireplace, concrete floor, electricity, five garbage cans and racks, and 10 tables will be provided for group picnicking. Two smaller shelters, equipped with four tables, grill at each end, concrete floor, and two garbage cans and racks are planned for individual or small group use. Twenty-one picnic units are planned, each consisting of a picnic grill, garbage can and rack, and two 6-foot tables. Parking will be provided by two blacktop lots accommodating about 70 cars. Two sanitary buildings will provide the necessary sanitary facilities.

The second picnic area is located on the north side of the lake between the dam and bathhouse and will accommodate about 140 people. A large shelter and two small shelters will provide picnicking facilities for groups. The shelters will have facilities as those previously described. Five picnic units will be constructed, each consisting of a picnic grill, two 6-foot tables and a garbage can and rack. One centrally located sanitary building will serve the areas. Access will be provided by a one-way, two-lane, 20-foot blacktop road to the second parking area. Two blacktop parking lots accommodating approximately 120 cars will provide parking for this picnic area as well as the beach area.

Swimming will be provided at a sand beach located adjacent to the picnic area on the north side of the lake. Facilities planned include three lifeguard stands, two diving platforms, buoys and ropes to mark the swimming area, sand beach, six 8-foot benches, and 10 garbage cans and racks. A bathhouse to include sanitary facilities for men and women is planned for installation above the beach area. A surfaced walkway will be built to provide safe access to the sand beach. The beach is designed to accommodate about 450 people at one time. This total does not include people in the water, nor those using the grassed open area above the sand beach. An open play area with playground equipment will also be provided in this area. Access to the area will be by a one-way, 12-foot blacktop road. Investigations at the time of planning showed that the quality of water was satisfactory for swimming. (See water quality data under environmental setting.) No significant change is anticipated in the foreseeable future.

Located at the upper end of the lake will be a boat dock with fish cleaning facilities and a gravel parking lot for about 20 cars. Access to the area is by a controlled access one-lane, 12-foot gravel road. About 4,000 linear feet of foot trails will provide easy and safe access to the lake. The West Virginia Department of Natural Resources will provide fishery management for the impoundment.

A sewage stabilization pond is planned as the treatment method for sewage from the development. The pond will be located below the structure with lines constructed from each of the sanitary facilities. The pond will have a surface area of 1.4 acres with an average depth of 5 feet and will dispose of approximately 25,000 gallons of effluent per day. Action of the pond will be equivalent to primary and secondary treatment. The lagoon will be aerobic and will reduce the BOD at least 90 percent.

Low flows in Lost River will be adequate to receive and assimilate the residual waste loads from the stabilization lagoon. The 7-day, 10-year low flow for Lost River at the point where the effluent from the stabilization lagoon enters is approximately 2 cubic feet per second. Anticipated peak flows from the lagoon will be about 0.05 cubic feet per second. Therefore, the 90 percent BOD reduction in the lagoon should be satisfactory, and the nutrients will have a beneficial effect on Lost River. However, the effluent from the lagoon will be disinfected by chlorinator to guard against pathogenic organisms entering the river. Monitoring of fecal coliforms will be done at least weekly during the recreation season. Samples will be taken on Lost River just downstream of the confluence with Cover Run.

Drinking water will be obtained from the lake with treatment by a packaged water treatment plant. A 100,000-gallon storage tank will also be a part of the system.

Plans for sanitary waste disposal and drinking water facilities have been coordinated with the West Virginia Public Health Department and their approval received. The Sponsors agree to operate and maintain the development in accordance with State health and sanitation standards.

All facilities in which federal cost-sharing is involved will be designed and constructed to assure accessibility and useability by physically handicapped people.

The following table lists the design capacity (DC), the daily design capacity (DDC), and annual visitors (AV) for each activity planned for the recreation facility:

<u>Activity</u>	<u>DC</u>	<u>DDC</u>	<u>AV</u>
Picnicking	430	860	43,000
Camping	280	280	14,000
Swimming	450	900	45,000
Fishing	50	75	3,750

To meet the Sponsors' objective of protection and improvement of existing fish resources, cold water outlets will be included in Structures Nos. 4 and 16 as measures to prevent any significant change in downstream water temperatures. The effects of structural measures on fish and wildlife were thoroughly evaluated and closely coordinated with the Wildlife Division of the West Virginia Department of Natural Resources.

Land Use Changes

Installation of structural measures and recreation facilities will require 735 acres of land and 2.4 miles of stream channel. Land use changes associated with structural measures are listed on the following page.

Expected land use in the watershed as a result of project installation is:

	<u>Present Use</u>	<u>Future Use Without Project</u>	<u>Future Use With Project</u>
Forest land	74%	76%	75%
Grassland	17%	16%	15%
Cropland	8%	7%	9%
Other	1%	1%	1%

With project installation, agricultural flood plain land use is expected to change from 27 percent for hay, 27 percent for pasture, 34 percent for corn, 5 percent for wheat, and 7 percent miscellaneous; to 17 percent hay, 16 percent pasture, 58 percent corn, 3 percent wheat, 3 percent recreation, 1 percent camping, and 3 percent miscellaneous.

LAND USE AFFECTED BY STRUCTURAL INSTALLATION

	Stream Surface Acres	Cropland Acres	Permanent Hay Acres	Pasture Acres	Forest Acres	Farmsteads Acres	Total
<u>Site No. 4</u>							
Dam & Borrow Area	0.5	0.0	0.0	22.0	17.5	0.0	40.0
Permanent Pool	0.7	0.0	0.0	48.0	21.3	0.0	70.0
Flood Pool	0.8	4.0	6.0	75.0	49.2	4.0	139.0
<u>Site No. 10</u>							
Dam & Borrow Area	0.3	0.0	6.0	4.0	8.2	0.0	18.5
Permanent Pool	0.8	0.0	2.0	10.0	3.7	2.0	18.5
Flood Pool	1.0	0.0	1.0	38.0	7.0	0.0	47.0
<u>Site No. 16</u>							
Dam & Borrow Area	0.3	8.0	0.0	22.7	9.0	0.0	40.0
Permanent Pool	0.5	8.0	10.0	8.0	23.5	0.0	50.0
Flood Pool	0.3	0.0	0.0	12.0	31.2	1.5	45.0
Recreation	0.0	17.0	0.0	17.3	63.2	0.5	98.0
<u>Site No. 23</u>							
Dam & Borrow Area	0.3	0.0	0.0	12.0	14.7	0.0	27.0
Permanent Pool	0.8	0.0	6.0	6.8	9.2	0.0	22.8
Flood Pool	1.0	7.0	4.0	32.2	5.0	3.0	52.2
<u>Site No. 27</u>							
Dam & Borrow Area	0.3	0.0	0.0	19.0	12.2	0.0	31.5
Permanent Pool	0.3	0.0	0.0	5.2	1.0	0.0	6.5
Flood Pool	0.5	0.0	0.0	23.7	4.8	0.0	29.0
Project Grand Total	8.4	44.0	35.0	355.9	280.7	11.0	735.0

OPERATION AND MAINTENANCE

Land Treatment

Land treatment measures on private land will be maintained by landowners or operators under agreement with the Potomac Valley Soil Conservation District. Technical assistance for maintenance of land treatment measures will be furnished landowners and operators as it is available from cooperating agencies. The U.S. Forest Service will maintain land treatment measures on George Washington National Forest land.

Roadbanks stabilized under this plan will be the responsibility of the Potomac Valley Soil Conservation District. These areas consist of 10 acres of actively eroding roadbanks. Maintenance will consist of weed control and treatment required to maintain a good vegetative cover. The district anticipates that operation and maintenance agreements will be reached with the State Department of Highways for performance of this work.

Structural Measures

The Potomac Valley Soil Conservation District will be responsible for operation and maintenance of Structures Nos. 4, 10, 23, and 27. This cost is estimated to be \$2,100 annually, which is an adjusted current normalized cost taking into account future trends. It is anticipated that this work will be performed by the West Virginia Department of Highways. Some of the more common maintenance items on these structures will be as follows:

1. Repair eroded areas and small slides in the vicinity of the earth embankment and emergency spillway.
2. Clean trash racks and remove floating debris.
3. Mow dam and emergency spillway area each year.
4. Seed and mulch bare areas which may occur after the establishment period.
5. Topdress the fill and emergency spillway with lime and fertilizer as needed.

6. Repair riprap and concrete as needed.
7. Clean stilling basin and outlet channel as needed.
8. Maintain fences.
9. Keep a record of operation and maintenance costs.

Normal maintenance and operation of the multiple-purpose structure at site No. 16 will be the responsibility of the Hardy County Court and Parks and Recreation Commission. Estimated average annual operation and maintenance cost on this structure and the recreational development is \$30,200. This cost consists of an estimated \$500 annually for the maintenance of the dam and emergency spillway and reservoir area and \$29,700 annually to cover replacement costs of recreational facilities, salaries of operating personnel, sanitation and safety in the recreation complex.

Common items of maintenance for the multiple-purpose dam will be the same as those listed for the single-purpose structures. Some of the basic items of operation for the recreational development will be as follows:

1. Regulating the number of users to insure that overuse does not diminish aesthetic value of the environment.
2. Confining travel of motor vehicles to designated areas and controlling speed.
3. Keeping each recreational facility clean and sanitary.
4. Disposing of garbage and other refuse as often as necessary.
5. Eliminating or minimizing all safety hazards such as dangerous trees and toxic plants.
6. Providing for chlorination of the lagoon effluent during the recreation season.
7. Monitoring fecal coliforms at least once a week on Lost River just downstream of the confluence with Cover Run.
8. Providing a full-time caretaker and seasonal help.
9. Maintaining a record of operation and maintenance costs and recreation use.

Some of the more common maintenance items include:

1. Reseeding areas to eliminate erosion.
2. Maintaining vigorous grass growth with fertilizers.
3. Mowing grass when needed.
4. Regularly servicing and maintaining facilities such as toilets, boat docks, and picnic tables and grills.
5. Managing excessive aquatic weed growth and eutrophication problems in the reservoir with consultation from West Virginia Department of Natural Resources.

In addition to the above items, the West Virginia Department of Natural Resources, Division of Wildlife Resources, will provide fishery management for multiple-purpose dam 16. This management will include stocking, annual population survey, restocking or removal as needed, and possible fertilization or other management indicated by past impoundment studies.

Structural works of improvement proposed in this plan will be jointly inspected for the first three years by concerned Sponsoring Local Organizations and representatives of the Soil Conservation Service. These inspections will be made annually and also after every major storm or other occurrence that might adversely affect the structures. Inspections after the third year will be made annually by the Sponsors. The Sponsor will furnish the Service a written report on each inspection.

Campsites and all other types of residential development will be discouraged on land below the 100-year flood elevation. Flood plain maps showing the elevation of the 5-year frequency flood and the 100-year frequency flood will be made available to local Sponsors. The Hardy County Court will make every reasonable effort to develop means of keeping land use in the flood plain commensurate with the protection provided. The Court will seek the development of zoning ordinances and building codes, and annually publish in local newspapers flood plain maps showing those areas still subject to flooding from a 100-year flood.

Project Costs

The following table summarizes total project costs; for a further breakdown of cost detail refer to Table 1 of the work plan.

	<u>P.L. 534 Funds</u>	<u>Other</u>	<u>Total</u>
Total Project	6,278,600	1,271,700	7,550,300
Land Treatment	142,000	328,500	470,500
Structural Measures	6,136,600	943,200	7,079,800
Construction	4,783,100	349,000	5,132,100

ENVIRONMENTAL SETTING

Physical Resources

Lost River Subwatershed is located in the eastern panhandle of West Virginia along the Virginia border. Its drainage area of 183 square miles or 117,120 acres, is confined to Hardy County, West Virginia. It includes all the drainage area of Lost River from its headwaters to its junction with Trout Run just west of Wardensville.

Lost River Subwatershed, as delineated by the Water Resources Council, is in Middle Atlantic Region (02) which ultimately discharges into the Atlantic Ocean. It is within land resource area No. 147, defined as the Northern Atlantic slope truck, fruit and poultry region. (2)

There are no incorporated towns in the subwatershed. There are five small towns or communities: Needmore, Baker, Lost River, Lost City, and Mathias. The nearest cities are Harrisonburg, Winchester, and Staunton, Virginia. Harrisonburg is about 30 miles south of the watershed boundary and is most easily reached by area residents. Staunton, which is 55 miles south, is considered to be the hub of integrated economic activity for this region, which the Bureau of Economic Analysis, Social and Statistics Administration, has delineated as Region No. 019.

The present population is estimated at about 2,000, resulting in a density of about 11 persons per square mile. These residents live in rural homes.

Aesthetics of the community are evidenced by uncrowded living conditions and high-quality visual surroundings. It has been broadly classified as a forest-town biome with 74 percent forest, 25 percent open field agriculture, and 1 percent other. Subtle deterioration of the environment is not obvious to the naked eye. The "Potomac Highlands," as it has been named by promoters, is an unique region of clean air, clean water, and undisturbed natural ecosystems.

Cultural resources in the county include some 12 to 15 large, historically significant, early American homes. Recreational and other cultural assets include Lost River State Park, Trout Pond, Hardy County 4-H Camp, Warden Lake, and others described elsewhere in this report.

This locality is less than 100 air miles from six standard metropolitan statistical areas which are:

- (1) Washington, D. C. 75 miles
- (2) Baltimore, Md. 90 miles
- (3) Lynchburg, Va. 80 miles
- (4) Johnstown, Pa. 60 miles
- (5) Altoona, Pa. 95 miles
- (6) Pittsburgh, Pa. 95 miles

Within a seven hour drive, there is a population of more than nine million. Extensive land transfers and higher land values are ascribed to the proximity of these metropolitan areas. Urbanites have invaded this and other contiguous watersheds in a search for home sites and recreation.

Population, per capita income, relative per capita income, employment population ratio, and relative earnings per worker are shown in Table 1. Water Resource Planning Area 19 relative figures are typical for Lost River Watershed. (3)

TABLE 1

Historical and Projected Population, Income and Employment for Integrated Economic Activity, Region 019, Staunton, Va.				
	1950	1969	1990	2010
Population (mid-year)	337,090	393,524	524,300	689,700
Per Capita Income (1967-\$)	1,476	2,625	5,099	9,461
Per Capita Income				
Relative (U.S. = 1.00)	.71	.77	.83	.87
Employment/Population Ratio	.36	N.A.	.39	.40
Earnings Per Worker				
Relative (U.S. = 1.00)	.78	N.A.	.86	.89

Lost River Subwatershed is in Water Resource Region (02) and Subregion (07) as delineated by the Water Resources Council. Lost River is typical of the Potomac River Basin Subregion (07) but non-typical of Region (02). The topography is characterized by nearly parallel ridges and valleys. Tributaries enter at near 90 degree angles forming a trellis drainage pattern. (2)

Frequent flooding and sediment damage to agricultural lands and improvements is the primary problem in the watershed. Flooding and sediment damage is also occurring to small businesses, residences, camps, roads, bridges, and utilities throughout the watershed.

Soils in the watershed are on alluvial bottoms, terraces, colluvial footslopes, and residual uplands. Alluvial soils have developed from recent stream sediments washed from upland areas and are composed of materials from shale, sandstone, and limestone bedrock. The most common alluvial soils are Pope, Philo, Atkins, Huntington, Lindside, Dunning, and Melven. Terrace soils are located on relatively flat benches above the present valley floor and are composed of sediments washed from upstream areas. Terrace areas have been formed by the erosion process of valley floods and are mainly different from the alluvial soils by having better developed profiles and by being higher on the landscape. Common terrace soils present in this area are Monongahela, Allegheny, Tygart, Purdy, and Blago.

Colluvial and residual soils are different in this watershed on each side of the valley mainly due to the bedrock formations on the west being acid while those on the east are either limestone or limy shales and sandstones. Colluvial soils are developed from material moved from adjacent uplands and are usually deep and subject to slipping on the steeper slopes. Common colluvial soils on the west side of the basin are Ernest, Laidig, and Buckanan. On the east side, the common soils on the colluvial footslopes are Laidig, Murrell, Clarksburg, Brookside, Buckanan, and Ernest.

Residual soils are formed in place from the parent material present. On the west side of Lost River, common residual soils are Lehew, Berks, Dekalb, Clavin, and Weikert. On the east side, the most common soils of the residual areas are Dekalb, Corydon, Litz, Lehew, Edom, Berks, and Schaffenecker. Complex soil patterns are common because of the steeply folded bedrock.

Land capability classification is a grouping of soils that shows suitability of soils for most kinds of agriculture use, and is a practical grouping based on use limitations, risk of damage from use, and the way soils respond to treatment.

The U. S. Department of Agriculture recognizes and defines eight land capability classes which are designated by Roman numerals I through VIII. The hazards and limitations to use increase as the Roman numerals increase. (4)

The watershed is broken down by percent of land classes as follows:

<u>Land Capability Class</u>	<u>Percent</u>
I	2
II	6
III	7
IV	15
VI	30
VII	38
VIII	2

Below is a brief description of each Land Capability Class.

Class I - Soils are suited to a wide range of plants and may be used safely for cultivated crops, pasture, forest, and woodland and wildlife. These soils are nearly level and erosion hazard (wind or water) is low. They are deep, generally well-drained, and easily worked. They hold water well and are either well supplied with plant nutrients or highly responsive to inputs of fertilizer. In Lost River, all land in this class is located in the flood plain and most of it is in intensive cultivation (continuous corn).

Class II - Soils require careful management, including conservation practices, to prevent deterioration or to improve air, and water relationships when the soils are cultivated. The limitations are few and the practices are easy to apply. These soils may be safely used for cultivated crops, pasture, forest, and woodland or wildlife food and cover. These are also soils of the Lost River flood plain and are used in cropland rotations of corn, grain, and hay.

Class III - These soils have more serious natural limitations, such as steep slopes, shallowness, too little, or too much water. The limitation may be erosion brought on by the way the land is or has been used. When used for cultivated crops, the conservation practices are difficult to apply and maintain. These soils may also be used for pasture, forest, and woodland, or wildlife food and cover. In the Lost River Watershed this class land is found along flood plain edges and upland terraces with main uses of hayland and pastureland.

Class IV - These soils have severe limitations and choice of plants is more limited. They are suitable for occasional but not regular cultivation, which means generally direct reseeding of perennial forage crops. Very careful management and very intensive

conservation practices are required even when only cultivated occasionally. These soils may also be used for pasture, forest, and woodland, or wildlife food and cover. These soils are on moderate upslopes in the watershed and are used mainly as pastureland.

The following classes contain those soils generally not suitable for cultivation but suitable for other uses:

Class V - These soils have limitations that restrict the kinds of plants that can be grown and that prevent normal tillage of cultivated crops. They are nearly level but some are wet, subjected to frequent flooding, are stony, have climatic limitations, or some combination of these limitations. Their use is limited to pasture, woodland, recreation, water supply, or wildlife food and cover. There are no Class V soils in the watershed.

Class VI - The physical conditions of these soils are such that it is practical to apply range or pasture improvements, if needed, such as seeding, liming, fertilizing, and water control with contour furrows, drainage ditches, diversions, or water spreaders. These soils have continuing limitations that cannot be corrected, such as steep slope, severe erosion hazard, effects of past erosion, stoniness, shallow rooting zone, excessive wetness or overflow, low moisture holding capacity, salinity or sodium, or severe climate. Because of one or more of these limitations, these soils are not generally suited to cultivated crops. However, they may be used for pasture, woodland, wildlife food and cover, recreation, water supply, or a combination of these. This land class is found on steeper slopes of the watershed and is used for pastureland and woodland.

Class VII - The physical conditions of these soils are such that it is impractical to apply such pasture or range improvements as seeding, liming, fertilizing, and water control with contour furrows, ditches, diversions, or water spreaders. Soil restrictions are more severe than those in Class VI, because of one of more continuing limitations that cannot be corrected, such as very steep slopes, erosion, shallowness, stones, wetness, salts or sodium, unfavorable climate, or other limitations that make them unsuited to common cultivated crops. When this land is used for grazing, it must be carefully managed. Land in this class can be used safely for woodland, recreation, water supply, or wildlife food and cover. These soils are found on the steepest slopes of the watershed and are almost entirely in woodland.

Class VIII - Soils and land forms in this class cannot be expected to return significant on-site benefits from management for crops, grasses, or trees. Its use is limited to recreation, water supply or very limited wildlife food and cover. These soils are found on the steepest and rockiest portions of Lost River and contribute to aesthetic values of the watershed.

Surface rocks are all of sedimentary origin and consist of limestone, sandstone, and shale. The age ranges from the Carboniferous to Ordovician Periods. These rocks are folded into a number of anticlines and synclines between two major geologic structures, the Sideling Hill Syncline on the west and the Adams Run Anticline on the east.

The topography is characterized by nearly parallel ridges and valleys. Major streams flow northeast with tributaries entering at near 90 degree angles forming a trellis drainage pattern. Elevations range from a high of about 3,300 feet on North Mountain to 1,000 feet at the mouth of the watershed.

The climate is moderate with few extremes in summer or winter. Temperatures rarely exceed 90°F. or stay below freezing for prolonged periods. Average annual rainfall is 35 inches and is well distributed throughout the year. The growing season is about 135 days and normally extends from mid-May to late September.

There are no major oil or gas fields, although gas is produced from scattered wells in the Lost River gas fields in the central part of the watershed and large transmission lines cross the area. The U. S. Department of Interior reports that, "Wells in this field and in two nearby fields found gas in structure traps at about 8,000 feet deep in the Oriskany formation. The 25,000 feet of sedimentary rocks, and very possibly 35,000 to 40,000 feet with repeated thrust faulting, have good possibilities for deeper structural and stratigraphic trap deposits. Although some earlier seismic work and wide-spaced drilling has been done, the area needs to be tested by newer seismic techniques and additional holes." There are no minable coals or metallic ores with potential for economic development.

There are no natural or artificial lakes other than farm ponds located in the subwatershed. The Soil Conservation Service has provided technical assistance on the installation of 126 farm ponds, averaging one-fourth acre in size, in the watershed. Trout Pond, the only natural lake in West Virginia, and Rock Cliff Lake are approximately 2 miles from the watershed drainage boundary. Warden Lake is located approximately 4 miles north of the subwatershed boundary. Principal water uses are for domestic purposes and come from wells, springs, ponds, and cisterns.

The entire Cacapon River, which includes Lost River, has been identified as having wild, and scenic river potential under Section 5(d) of the Wild and Scenic Rivers Act. At the present time, however, it enjoys no special protection or status.

Present land use of the watershed is 8 percent cropland, 17 percent grassland, 74 percent forest land, and 1 percent other. Approximate crop distribution in the watershed at the present time is 22 percent corn, 62 percent hay and pasture, and 16 percent small grains.

Present forest stands are 88 percent hardwood (mainly the oak types with their various associated species, including some beech-birch-maple), 8 percent mixed stands (oak mixed with pitch, white, shortleaf, and Virginia pine), and 4 percent pine types. About 29 percent of the forest stands are of saw timber size, 50 percent in pole size stands, and 21 percent in seedling and sapling size stands.

Lost River heads in the southern end of Hardy County along the West Virginia-Virginia border. It flows northeast for about 18 miles through a relatively straight valley. The river then enters a rugged area for about 5 miles to a point along Sandy Ridge. In this vicinity, Lost River sinks into a cavernous area in the Helderburg Limestone. It emerges about 1.5 miles to the northeast and is then called the Cacapon River. Only during periods of low flow does the river sink completely. Flood flows follow the defined surface channel and flood plain.

Lost River is an unmodified, well-defined natural stream throughout most of its length. Several sections of Lost River and major tributaries of the watershed have been modified by landowners engaged in channel repair work. The modification work usually consists of moving rock bars from the channel bottom to stream banks. These sections range in size from 300 feet to 2,400 feet, are generally temporary, and require annual repair.

Lost River and two of its tributaries, Camp Branch and Lower Cove Run, have been designated as quality streams by the West Virginia Department of Natural Resources. These streams, including Culler Run, have good water quality and flow at all times except during extreme drought. Baker Run and Upper Cover Run are classified as intermittent and may have little or no flow during dry seasons.

Waters of Lost River Watershed are described as Class A waters by water quality criteria of the Interstate Commission of the Potomac River Basin. These waters are suitable for a potable water supply with no treatment necessary except chlorination. The waters may also be used for bathing, fish life, recreation, and industrial process water.

Sources of pollution in the watershed are sediment, agricultural runoff, and domestic wastes. Neither agricultural runoff nor domestic wastes is significant because cropland is limited to 8 percent of the watershed, and the population density is 11 people per square mile. Fecal material will be occasionally deposited in the streams from livestock, but low water temperatures will kill pathogens after brief exposure.

The table on page 26 lists water quality data for the Lost River Watershed. The data indicates that streams of the watershed are typical of clear infertile streams of the Potomac River headwaters. Bacteria counts of Lower Cove Run fall within levels of good quality water for recreational purposes. Note that acidity, turbidity, or iron was not detected in any of the samples.

Fish and Wildlife Resources

Hardy County, particularly Lost River Watershed, is regarded as one of the outstanding hunting areas in West Virginia and surrounding states. Hardy County rates in the top five counties in the State for squirrel, grouse, turkey, and deer annual harvest. Hunters, especially from the eastern metropolitan areas, spend an estimated 15,500 hunter-days annually in the watershed. This resource has an estimated value of \$102,000 annually in Lost River Watershed.

The table on page 27 indicates the major wildlife species and their approximate population densities in their preferred habitat in Lost River Watershed. The inventory is based on the 1958 and 1968 hunter surveys, updates by the West Virginia Department of Natural Resources, 1972 estimates, game checking data, and personal observations. These figures represent populations as of December 1972.

WATER QUALITY

Lost River Watershed

Location	Site Number	Date	Air ° F.	Water ° F.	pH	Alkalinity mg/L.	Dissolved O ₂ mg/L.	Hardness mg/L.	Acidity mg/L.	Turbidity J.T.U.	Fe mg/L.	Conductivity mhos/cm.	Total Coliform organisms/100	Fecal Coliform organisms/100
Kimsey Run	4	10-27-70	55	57	7.3	30	10	35	0	0	0			
Kimsey Run	4	2-19-71	18	32	6.8	10	14	20	0	0	0			
Kimsey Run	4	4-23-71	65	53	6.8	15	11	20	0	0	0			
Kimsey Run	4	7-30-71	83	72	6.8	30	7	30	0	0	0			
Lower Cove	16	10-27-70	55	53	7.6	110	10	110	0	0	0			
Lower Cove	16	2-19-71	18	32	7.2	30	14	40	0	0	0			
Lower Cove	16	4-23-71	65	51	7.5	45	11	60	0	0	0			
Lower Cove	16	7-30-71	83	69	7.4	90	9	100	0	0	0			
Lower Cove	16	10-18-73	-	-	-	-	-	-	-	-	-		2300	43
Baker Run	10	10-10-73	63	63	7.1	50	9	50	0	0	0			Health Dept. Test
Cullers Run	23	10-10-73	70	63	8.3	30	9	30	0	0	0			
Upper Cove	27	10-10-73	69	63	7.2	100	10	100	0	0	0			
Lost River	-	1-29-64	28	36	7.0	30	-	30	-	-	-	120		@ Wardensville
Lost River	-	10-10-73	64	64	7.0	65	10	60	0	0	0			@ Lost City

Total Area: 117,120 acres

Acres In: Forest Land: 86,670 Pasture Land: 19,910
Cropland: 9,370 Other Land: 1,170

Species	Forest Land		Pasture Land		Cropland		Other Land		Total
	Per		Per		Per		Per		Popula-
	:Acre	Total	:Acre	Total	:Acre	Total	:Acre	Total	: tion
Deer	.03	2600	.0031	62	.0031	29	.005	6	2697
Bear	.00006	5	--	--	--	--	--	--	5
Rabbit	.06	5200	.064	1274	.054	506	--	--	6980
Squirrel	.18	15600	--	--	--	--	.06	70	15670
Fox	.00125	108	.00078	15	.0078	73	.0078	9	205
Raccoon	.019	1646	.0078	155	.08	750	--	--	2551
Woodchuck	.005	433	.08	1592	.09	843	.12	140	3008
Grouse	.023	1993	--	--	--	--	--	--	1993
Turkey	.007	606	--	--	--	--	--	--	606
Mourning Dove	.005	433	.05	995	.03	2811	.05	58	4297
Bobcat	.007	606	--	--	--	--	--	--	606
Quail	.015	1300	.005	100	.12	1124	.09	105	2629

Stream Habitat			
	Per		
	Mile	Miles	Total
Beaver	3	45	135
Muskrat	38	60	2280
Wood Duck	4	20	80
Mallard Duck	1	10	10

The following table lists the big game annual harvest figures for the past four years in Hardy County. During this period, Hardy County has been in the top five counties and often leads the state in turkey and deer kills.

Hardy County	1969	1970	1971	1972
Deer(Bow)	51	52	54	145
Deer(Gun)	1308	1477	1550	1974
Bear	0	1	1	1
Turkey (Fall)	538	426	318	263
Turkey (Spring)	38	64	64	85

The future of big game hunting looks particularly good in Lost River Watershed as populations of deer and turkey are expanding. Approximately 82 percent of big game hunters are state residents who kill about 75 percent of their game on privately-owned land. The potential for bear hunting in the watershed is low as human usage of remote areas increases. No rare or endangered wildlife species of West Virginia are known to exist in Lost River Watershed and no natural wetland type habitat occur there.⁽⁵⁾

The main fishery resource of Lost River Watershed is a put-and-take trout stocking program conducted by the West Virginia Department of Natural Resources (DNR). In 1970, 4,361 pounds of trout were stocked in Lost River from Lost City to near where Lost River sinks. About one mile of Camp Branch of Kimsey Run and 2.5 miles of Lower Cove Run each receive spring stockings of about 160 pounds of trout. Camp Branch of Kimsey Run is approximately 2 miles upstream from proposed structure No. 4 (see Gap Run on project map, Appendix E). Low flow periods and temperature increases (see water quality data) during summer months restrict trout fishing to spring and fall months. An estimated 6,500 fishing days are spent in the watershed annually, resulting in an average annual value of \$32,500.

Fishing within the watershed boundary is limited to Lost River, Kimsey Run, and Lower Cove Run due to the intermittent nature of the other streams such as Upper Cove Run, Baker Run, Cullers Run, and the lack of fishable impoundments. Although Lost River is considered trout water, other major game fish present are largemouth bass, smallmouth bass, rock bass, and sunfish. Fishing pressure for these species is considered light.

Sections of Kimsey Run, Lower Cove Run, and Cullers Run were sampled with a parallel wire shocker to determine species diversity and abundance. The following table lists the species found and abundance as uncommon (U), common (C), or abundant (A).

<u>Species</u>	<u>Abundance</u>	<u>Species</u>	<u>Abundance</u>
<u>Cyprinidae</u>		<u>Catostomidae</u>	
fallfish	C	white sucker	C
stoneroller	A	hog sucker	C
blacknose dace	A		
longnose dace	A	<u>Centrarchidae & Salamonidae (gamefish)</u>	
cutlips minnow	U	smallmouth bass	C
silverjaw minnow	U	rock bass	C
spotfin shiner	U	brook trout	U
spottail shiner	U		
creek chub	A	<u>Percidae</u>	
<u>Cottidae</u>		fantail darter	C
northern sculpin	A	greenside darter	U

Minnows, suckers and darters were the dominant fish in the surveyed streams. Game fish made up 8.17 percent by weight, of the total weight collected at all stations. Invertebrates found in Lost River and its tributaries were typical of unpolluted, fast flowing, rock bottom West Virginia streams, and included stoneflies, caddis flies, and mayflies. Total production of fish in pounds per acre has been estimated to be 203, including 84 pounds per acre of desirable fish.

Common reptiles and amphibians of Lost River Watershed include: Red Spotted Newt, Plethodonid Salamanders, Bullfrog, American Toad, Common Snapping Turtle, Eastern Box Turtle, Northern Water Snake, Eastern Garter Snake, Black Racer, Copperhead, Timber Rattlesnake, and Five-lined Skink. No rare or endangered species were found in Lost River Watershed. (6,7)

Economic Resources

Approximately 24,000 acres of the subwatershed are inside the proclamation boundary of the George Washington National Forest: half this acreage is actually in national forest ownership. There is public access to this area. About 3,700 acres are located in Lost River State Park and administered by the West Virginia Department of Natural Resources. The remaining land within the watershed boundary is in private ownership.

Statistical data that follows is from the 1969 Census of Agriculture (8) and is typical of Lost River Watershed:

<u>Hardy County</u>	<u>1969</u>	<u>1964</u>
All farms (number)	607	794
Average size (acres)	288	251
Value of land and buildings (dollars)	20,436,940	(NA)
Average per farm (dollars)	33,668	13,840
Average per acre (dollars)	117	54
Tenancy (percent)	5.4	4.7
Farms in economic classes:		
Class 1 - sales \$40,000 and over (number)	52	27
Class 2 - \$20,000-\$39,999	" 61	45
Class 3 - \$10,000-\$19,999	" 67	84
Class 4 - \$ 5,000-\$ 9,999	" 64	84
Class 5 - \$ 2,500-\$ 4,999	" 85	72
* Class 6 - \$ 50-\$ 2,499	" 66	129
** Part-time \$ 50-\$ 2,499	" 141	186
Retirement \$ 50-\$ 2,499	" 70	166
Other	1	1

* Operator under 65 years of age who did not work off farm.

** Operator under 65 years of age who worked off farm 100 days or more.

Approximate crop distribution in the watershed at the present time is 22 percent corn, 62 percent hay and pasture, and 16 percent small grains. The expected yields for a normal season are hay - 3 tons per acre, pasture - 100 cow/acre days, corn - 120 bushels per acre, silage - 20 tons per acre, and wheat - 30 bushels per acre.

Flood free yields as projected over the project evaluation period are hay - 5 tons per acre, pasture - 200 cow/acre days, corn - 150 bushels per acre, silage - 27 tons per acre, and wheat - 50 bushels per acre.

Land in the flood plain that has potential for recreational development is estimated to have an average value of \$1,000 per acre.

Good markets are available for agricultural products in this area. Contract marketing arrangements with feed companies are readily available for broiler producers. Local markets are good for quality sawlogs, veneer logs and railroad ties; markets for pulpwood are fair to good.

The area has a good network of primary and secondary roads. West Virginia Route 259 parallels Lost River and bisects the watershed in a northeast-southwest direction. West Virginia Route 55 crosses the northern end of the watershed in an east-west direction. There are no railroads or airports.

Appalachian Regional data as of 1967 indicates that the most significant industry in Hardy County, in terms of earnings, is business services and public services, with manufacturing ranking second. Approximate distribution of earnings by broad industrial sectors is as follows:⁽³⁾

Business and Public Services	- - - -	40 percent
Manufacturing	- - - - -	28 percent
Trade	- - - - -	15 percent
Farming	- - - - -	9 percent
Utilities	- - - - -	4 percent
Construction	- - - - -	3 percent
All Other	- - - - -	1 percent

The above figures are also typical of the watershed.

Hunting and fishing provide a seasonal boost to the economy. In 1964, income from hunting, fishing and other recreational privileges amounted to \$22,100. These activities occurred on 46 different farm units.

Present population of the watershed is estimated to be 2,000, which amounts to about 11 persons per square mile. All of the inhabitants live in rural areas or small villages ranging from 2 to 7 miles apart. Density of population for the State of West Virginia is 77 per square mile.

In 1965, the annual average total unemployed persons in Hardy County was 310, which was 10.5 percent of the annual average work force.

The average unemployment rate over a three-year period from 1965 to 1967 amounted to 10.3 percent.

This watershed is within the boundary of the eight-county Potomac Headwaters Resource Conservation and Development Area. Hardy County is within the corporate boundaries of the Upper Potomac Economic Development District, the five-county Potomac Valley Soil Conservation District and in the Appalachian Region.

Recreation Resources

This rural watershed has many natural resources for attracting visitors, which include outstanding mountainous scenery with farmsteads and high quality, free-flowing streams. Residents of eastern metropolitan areas frequently visit this area for weekends or summer vacations.

The only developed, public recreation facility within the watershed boundary is Lost River State Park operated and maintained by the West Virginia Department of Natural Resources. This 3,700-acre park has facilities for swimming, picnicking, hiking, horseback riding, and games. Also available, are 24 cabins for rental, a recreation building, and a park restaurant. There are approximately three farms in this watershed that participate in the State-sponsored vacation farm program. These farmowners provide food and lodging, and farm experiences for their guests. Some have horseback riding facilities and small farm ponds for fishing. This type of recreation has been very popular and also a profitable part-time business for farm operators. Other developed recreation facilities near this watershed are as follows:

1. Spruce Knob-Seneca Rocks National Recreation Area: This 100,000-acre recreation area was established by the Congress in 1965 and is located approximately 45 miles west of the watershed. This area is being developed by the U. S. Forest Service as part of the Monongahela National Forest to provide public outdoor recreation for the people of the United States. Facilities will be available for camping, swimming, fishing, picnicking, hiking, and scenic overlooks.
2. Wolf Gap Recreation Area: This development, located approximately 10 miles south of Wardensville in the George Washington National Forest, provides about 15 camp sites for tents or trailers and ten picnic tables.
3. Hawk Recreation Area: This development is located approximately 4 miles northeast of Wardensville in the George Washington National Forest and has 15 camping units and about 20 picnic tables for use. There is also a group camping facility available.

4. Rock Cliff Recreation Area: This development for camping, picnicking, and fishing, located in the George Washington National Forest approximately 2 miles east of the watershed boundary, is presently being expanded. The original development included only a picnic area around a 1-acre natural lake. A new 14-acre lake, mainly for trout fishing, has been constructed with camping and picnic units being installed at present. The final development will include 160 camping and 100 picnic units.

5. Brandywine Recreation Area: This development is located in the George Washington National Forest approximately 30 miles southwest of the watershed boundary. Facilities provided at the development include a swimming beach, fishing, camping, and picnicking units.

Warden Lake is primarily a fishing lake and has only a limited number of picnic tables. Sanitary facilities are also available.

The following table provides estimates of annual recreation visits received by the above mentioned National Forest recreation sites. The planned use figures include developments that are not now presently in place.

<u>Location</u>	<u>Present Use Annual Visits</u>	<u>Planned Use Annual Visits</u>
Spruce Knob	67,800	2.5 million
Wolf Gap	5,700	36,750
Hawk	5,300	87,750
Rock Cliff	36,000	180,000
Brandywine	23,300	178,000

The following table summarizes the appraisal of potential for development of outdoor recreation facilities in Hardy County. Favorable key elements that contributed to these ratings included favorable climate, above average scenery, and proximity to large urban centers. A high rating indicates that a category has good potential for commercial development in the county based upon the resources present. (9)

<u>Category</u>	<u>Development Potential</u>
Vacation cabins	High
Camping grounds	High
Picnicking	Medium
Fishing waters	High
Golf courses	Low
Hunting areas	High
Scenic & historic areas	High
Shooting preserves	Low
Vacation farms	Medium

Archeological and Historical Resources

There are no known archeological or historical sites which would be affected by proposed structural measures. The West Virginia Antiquities Commission and the West Virginia Economic and Geologic Survey were contacted for information during plan development.

Several examples of the historical aspects of Lost River can be found in the watershed today. The valley was first settled by pioneer families in the early 1700's. Grants of land in Lost River were first surveyed for Lord Fairfax by George Washington in 1748. The 200-year old Hawse homeplace and 125-year old Woodlawn exist today on land surveyed by Washington. During Revolutionary times, the present Lost River State Park was a summer resort which catered to southerners. Lee Cabin, which is situated in the park, was once the summer home of Revolutionary General "Lighthorse" Harry Lee and has been nominated for listing in the National Register of Historic Places.

Other historic points of interest in Lost River Watershed include Ruddle's Fort (old Inskeep place), Warden's Fort and Green Valley Farm. (10) Hardy County has been appraised to have high potential for commercial development of scenic and historic places.

Soil, Water, and Plant Management Status

Land use in the watershed is under a gradual change mainly due to small farms being purchased by larger operators, and the increase of part-time farmers. The change is mainly in upland areas where cropland is changing to grassland. Future land use projections to the year 2000 show a 32 percent reduction in cropland. The average size farm today is 200 acres compared to 150 acres 20 years ago. Some increase in forest land is also occurring as poorer land is removed from agricultural production. Urban dwellers, mainly from the Washington, D. C. area, are also purchasing farmland for recreation purposes.

The Potomac Valley Soil Conservation District directs a balanced land treatment program in this area. Within the watershed boundary there are 393 farms. Of this total, 337 are district cooperators owning 58.6 percent of the watershed. Approximately 25 percent of the conservation practices planned on cooperator farms have been established. Land use is 8 percent cropland, 17 percent grassland, 74 percent forest land and 1 percent miscellaneous.

WATER AND RELATED LAND RESOURCE PROBELMS

Land Treatment Problems

Over 80 percent of the soils in this watershed are in agricultural land capability Classes IV, VI, and VII. These classes have severe limitations that require careful management and limit their use largely to pasture and forest. Conservation land treatment is needed on 94,750 acres of watershed land including 1,400 acres of cropland, 7,000 acres of grassland, 86,300 acres of forest land, 25 acres other land, and 25 acres critical area.

Soils of the watershed are typically low in fertility and many up-land farms and fields are too small or steep for efficient use of modern equipment. Typical land treatment problems include overgrazing of steep pastures, low forage production due to low fertility and continuous grazing of forest land, lack of cropland protection, and erosion from farm and forest roads. The average annual erosion rate was estimated to be 3.4 tons per acre for the areas above structure sites. Needed adjustments appear to be within the financial ability of most watershed landowners but assistance is needed through the acceleration of current programs to encourage widespread application of conservation practices.

Frequent flooding and sediment damage to agricultural lands and improvement also present land treatment problems in the watershed. Many landowners report areas of flood plain land, once in cultivation, are now abandoned or are low income-producing units because of the treatment or adverse effects of flooding such as late seeding and harvesting.

Floodwater Damage

An estimated 1,990 acres of the watershed, excluding stream channel, is flood plain, and is the area inundated by the 100-year frequency flood. Floods that cause damage estimated to exceed \$284,000 occur about every 10 years. Local people generally remember the floods of 1936, 1942, 1949, and 1970, and readily recall the flood of 1954, which was the result of Hurricane Hazel. The frequency of a flood of this magnitude was determined to be less than 10 years, and a repeat would cause damage estimated at \$250,000. The 1954 flood will be exceeded by 4 feet on an average of once in 100 years and would cause about \$705,400 in damages.

On an average annual basis, direct damage within the watershed flood plain amounts to \$151,900.

The above-mentioned damage area extends from the headwater of the watershed above Mathias to Wardensville. Another problem area associated with this watershed extends downstream outside the project area. Direct average annual downstream damages have been specifically identified on the contiguous Upper Cacapon River flood plain and amount to \$88,000 annually.

Direct average annual damages to flood plain properties by type are arrayed as follows:

Downstream sediment	\$217,400
Downstream floodwater	88,000
Floodwater (in the Watershed)	
Crop and pasture	30,800
Dwellings	28,000
Other agriculture	27,400
Streambank	20,800
Road and bridge	18,700
Commercial	13,300
Erosion	8,100
Sediment	<u>4,800</u>
Total	\$457,300

Properties involved in downstream floodwater damage include 7.5 miles of paved road, 4 bridges, 97 cottages, 8 farmsteads, and approximately 2,000 acres of crop and pasture land. Another 527 acres of crop and pastureland exist in the watershed which floods at least once every 5 years.

Income lost from crop and pastureland that could be restored with project action was counted as crop and pasture damage under present conditions. This amounted to \$26,400 annually. One hundred and twenty farm units are subject to flooding. Damage to other agriculture includes about 11,000 rods of fence, eight poultry or broiler houses, 35 large farm buildings, and numerous small sheds, etc. Eleven commercial establishments receive frequent flood damage.

Several flood plain landowners are aware of the constraint that flooding has on land use for recreational purposes. The potential net income foregone by this adverse effect is estimated as \$17,500 annually.

Efforts in the past to control or prevent flooding have consisted of extensive channel repair, diking, and streambank stabilizations. These efforts have had little effect on the reduction of flood damage and have a very high maintenance cost. Approximately one-third of the farmers along the stream engage in annual channel repair work. Despite these efforts, 527 acres are flooded by the 5-year frequency flood event and land use is restricted.



Scour damage
after flood on
Lost River.



Stream bank
erosion in
foreground
and sediment
deposition in
background.



Farm pond on Lost
River that is used
for livestock
watering and
family recreation.

Agri-business
development on
Lost River
floodplain.



Erosion Damage

Erosion caused by out-of-bank flows has damaged approximately 506 acres of agricultural flood plain. The most seriously damaged areas are just upstream of the communities of Lost River and Lost City. The stream cuts diagonally across the flood plain of both these locations and flood flows have created scour channels immediately downstream. The most common scour damage is in narrow strips of low land below meanders where flood flows are concentrated. Streambank erosion is not a serious watershed problem; however, locally serious damage is occurring just above the highway bridge at Lost City and through the community of Mathias, particularly at the mouth of Upper Cove Run. Annual flood plain erosion damage, including streambank erosion, is estimated to be \$28,900.

Sheet and rill erosion is responsible for 97 percent of the sediment leaving Lost River Watershed. Average erosion rates for major land uses are as follows: row crops 18 tons/acre, grassland 3.5 tons/acre, forest land 2.5 tons/acre. Erosion in woodlands includes that from various sources such as old roads, trails, pipelines, small open areas, and pastured woodland. When the appropriate delivery ratio for the entire watershed is applied (0.08), the computed erosion rate produces a sediment yield which agrees with yields established for this area of the Potomac Basin at the nearest gage.

Critically eroding areas consists of 15 acres of scattered, bare areas in pastures and 10 acres of roadbank. There are no areas being disturbed by highways, mining, or housing developments, and none are anticipated in the near future.

Sediment Damage

Flooding of the main stream deposits sediment on about 691 acres of the flood plain. These sediment deposits damage agricultural land and represent a direct economic loss to the farmers. The source of this sediment is from bedload and material eroded from the flood plain in areas subject to scour damage. The areas most seriously damaged are those subject to flooding by the 2- and 5-year frequency flood events. Annual sediment damage to the agricultural flood plain is estimated to be \$4,800.

Estimates of gross erosion and sediment delivery for the watershed were developed during planning. This data was used to compute estimates of annual sediment production from the watershed which amounts to 34,500 tons per year. Stream flow measurements are not available for Lost River Watershed so sediment loads cannot be expressed in parts per million.

Sediment yields from the subwatershed contribute to the total sediment load of the Potomac River which causes problems in downstream areas. An unmeasured quantity of this sediment deposits in the Potomac River, but it eventually reaches the Potomac estuary. Resources damaged by the sediment include metropolitan water supply, navigation, commercial fishery, boating, and aesthetics.

The Potomac estuary is navigable up as far as Washington, D. C. Dredging is necessary to maintain a 24-foot wide channel. Almost 90 percent of the cost of dredging is attributable to spoil disposal. Available areas for dumping are becoming scarce and restrictive.

Intakes for Washington, D. C. water supply aqueduct are located on the Potomac River at Great Falls and Little Falls. Water supply personnel report that sediment treatment results in higher treatment and supply costs.

Dockside value of 17 million pounds of fish, crabs, clams, and oysters produced in the Potomac estuary amounted to \$4,500,000 in 1969. The estuary is in a strategic location for recreational and commercial fishing. Despite desirable natural features, there is a low density of aquatic life. Sports and commercial species are damaged by sediment because of reduction in sunlight, changes in temperature, clogging of gills, and smothering of spawning beds and eggs.

An estimated 50,000 pleasure boats use the Potomac. Boating enthusiasts have been pleading for a cleaner Potomac for several decades. Their problems include muddy water, silt bars, algae blooms, sewage, foul odors, and floating debris. If the river were cleaner, boating could easily increase 33 percent.

Natural parks, memorial structures, a national cemetery and hundreds of high-rise apartment buildings have been placed overlooking the Potomac. A problem to the viewing enthusiast is that of unsightly muddy water and repulsive debris. In view of its setting for the nation's capital, the Potomac River Basin is ideally and uniquely situated to serve as a model for the entire country. Sediment damages to the aesthetics of the Potomac River are of national concern.(11,12)

Recreation Problems

Hardy County is located within recreation development Region VI of the standard planning areas of West Virginia. These regions were developed from a set of criteria which resulted in a composite of numerous characteristics relating to social, political, economic, and physical activity. Region VI includes Pendleton, Grant, Hardy, Mineral, Hampshire, Morgan, Berkeley, and Jefferson Counties, which encompass West Virginia's Eastern Panhandle.

The demand for recreation opportunities in Region VI is projected to be over 4.5 million recreation days by the year 2000. Present and future planned developments will not be able to accommodate this demand. The projected unmet recreational demands for the year 1985 are as follows: (13)

<u>Activity</u>	<u>1985 Unmet Demands</u>
Boating (acres)	6,863
Camping (sites)	4,646
Fishing (acres)	8,189
Hiking (miles)	2,137
Riding (miles)	2,659
Hunting (acres)	1,746
Picnicking (sites)	6,808
Swimming (areas)	42,909

Within a 7-hour drive of this watershed is a population of more than nine million people. The population within a 50-mile radius, which includes Hardy County and seven adjoining counties, is about 160,000. The standard metropolitan areas of Washington, D. C.; Baltimore, Maryland; Lynchburg, Virginia; Johnstown, Altoona, and Pittsburgh, Pennsylvania; are all within a 5-hour drive of this area.

Local interests have been reluctant to provide adequate opportunities for public recreation, mainly due to financial reasons. Private owners are also hesitant to grant permission to use their land for fishing and hunting.

Fish and Wildlife Resource Problems

Game resource problems associated with Lost River Watershed are increasing deer population, posted private land, and improper timber harvest practices. Deer populations in certain areas of Hardy County and Lost River Watershed approach (or exceed) range capacities as evidenced by decreased physical growth, high numbers of deer-vehicle collisions, and extensive range and crop damage. In 1972, Hardy County reported the highest non-seasonal mortalities with 230, mostly killed by automobiles. Hardy County is among four counties that reported 81 percent of the state total crop damage kills. The West Virginia Department of Natural Resources biologists report that deer parasites have greatly increased and estimate that the doe-buck ratio is about eight females per male. The Wildlife Division, Department of Natural Resources has recommended a special post-season permit hunt to harvest a prescribed number of antlerless deer from five counties including Hardy County.

Law enforcement officers estimate that about 75 percent of private land in Hardy County is posted and hunting by permission is often difficult to obtain. Other game problems include destructive timber harvest practices and improper road building that lead to erosion problems and habitat destruction in timber areas.

Fishery resources in the watershed have been adversely affected by stream channel disturbances, low summer stream flows, lack of lake waters, and few public access areas.

Approximately one-third of the farmers along streams in Lost River Watershed engage in annual channel restoration work. This work usually involves restoring channel capacities by moving rock bars and debris from channel bottoms to stream banks. Such debris is normally deposited by annual floodwaters, often blocks channels, and increases streambank erosion. As a result of Hurricane Agnes in June 1972, approximately 65 landowners in Lost River Watershed participated in stream channel restoration work with the assistance of over \$25,000 in emergency relief funds from the Agricultural Stabilization and Conservation Service, Corps of Engineers, and Farmers Home Administration.

In removing rock bars and debris from streams, fish habitat is usually removed or disturbed. Fishery biologists of the West Virginia Department of Natural Resources state that stream restoration work is a major fishery

resource problem of Lost River Watershed. Department of Natural Resources biologists estimate that from 60 to 100 percent of the fish habitat is removed or temporarily disturbed by stream restoration work, and would cost approximately \$3,000 per acre to replace the habitat, about \$100 per acre to replace the fish population losses, and could result in a loss of 140 man-days/acre per year. These disturbed areas range in size from several 300 foot sections of Lost River, to a 2,400 foot section of Kimsey Run. (14)

Economic and Social Problems

Seventy percent of the farm operators' households indicated an income of less than \$5,000 from the sale of farm products. In 1965, the annual average total unemployed persons were 10.5 percent of the annual average work force.

Between the years, 1950 and 1965, there was a 7 percent decline in population. The public assistance program had a case load of 405 in 1965.

Other Problems

Water quality, water supply, irrigation water, and drainage, are not considered to present any significant problems in this watershed. Small villages and rural homes use springs or individual wells for water. These supplies are considered adequate for present and future needs. Some sediment and human and animal pollution is present, but to a limited extent. Rainfall is normally adequate for high crop production. Approximately 120,000 feet of tile drains have been installed in watershed cropland.

ENVIRONMENTAL IMPACTS

Conservation Land Treatment

Approximately 94,750 acres of watershed land will be directly affected by the application of conservation land treatment measures. Both vegetative and structural types of land treatment measures will effectively reduce runoff, conserve soil moisture and prevent excessive loss of topsoil on 337 district cooperator farms.

Land treatment will help restore and maintain soil productivity by adding or holding plant nutrients, and, where appropriate, changing land to a less intensive use. Degradation of surface waters by nitrogen, phosphorous, pesticides or other agricultural pollutants attached to soil particles will be reduced by reducing erosion and by utilizing proper fertilization methods.

Conservation land treatment on 86,300 acres of forest land, 7,000 acres of grassland, 1,400 acres of cropland, 25 acres of miscellaneous land and 25 acres of critical areas will result in increased timber, forage, hay and crop production; improvement of aesthetics in the watershed. Many of the land treatment measures will enable landowners to more fully utilize sound land management practices to increase efficiencies of production. Land treatment measures are estimated to reduce the sediment yield of Lost River by 15.3 tons per square mile per year.

Land treatment measures will reduce the amount of sediment leaving the watershed by about 2,810 tons annually. The sediment leaving Lost River contributes to the total load of the Potomac River. Reduction of sediment leaving the watershed will lessen downstream damages to municipal and industrial water supplies, fish habitat, recreation, dredging, and aesthetics.

Structural Measures

Installation of proposed structural measures will require 735 acres which includes 143 acres for sediment pools, 292 acres for retarding pools, 148 acres for recreation pool and facilities, and 152 acres for dams, emergency spillways and borrow areas.

Agriculture and associated upland wildlife habitat will be eliminated from about 291 acres of woodland, cropland, and pastureland. Temporary flooding of an additional 292 acres will periodically interrupt agriculture and wildlife in floodwater retention pools. The five structures will inundate about 150 acres of pastureland, 30 acres of scattered hardwoods, and 13 acres of cropland. This will eliminate some deer, rabbit, and squirrel habitat (0.5 of 1 percent of the total habitat), but will not affect the huntable population. Additional habitat will be created by plantings on dams, emergency spillways, and borrow areas with species selected in consultation with the West Virginia Department of Natural Resources for wildlife habitat values.

Sediment pools and the recreation pool will inundate approximately 2.4 miles of free flowing streams as a fishery and aesthetic resource. The following table summarizes the physical effects of the structures on the streams and ambient environment.

<u>Site Number</u>	<u>4</u>	<u>10</u>	<u>16</u>	<u>23</u>	<u>27</u>	<u>Total</u>
Acreage Inundated	70	18.5	50	22.8	6.5	167.8
Habitat Inundated	G,W	G	G,C	G,W	G	--
Miles Stream Affected (miles)	0.9	0.3	0.6	0.4	0.2	2.4
Stream Type	Q,C,D	I,W	Q,C	W	I,W	--
Acreage of Flood Pools	214	65.5	95	75	35.5	485.0
Acreage Aquatic Habitat Created	70	18.5	50P	22.8	6.5	167.8

G - Grassland

Q - Quality Stream

I - Intermittant

W - Woodland

C - Cold Water

D - Disturbed (habitat)

C - Cropland

W - Warm Water

P - Public Fishing

Land inundated by permanent pools will change from upland wildlife habitat to aquatic habitat. Proposed reservoirs will create opportunity for still water fishing on 167 acres. The West Virginia Department of Natural Resources will stock and manage the fishery (trout, largemouth bass, and bluegill) at the 50-acre recreation site. Fish production in the impoundment is estimated to be at least 170 pounds per acre, and the site will provide an estimated 3,750 man-days of fishing annually. Cold water outlets at Sites 4 and 16 will maintain cold water fishery resources of Lower Cove Run, Kimsey Run, and Lost River. Plans for cold water outlet structures will be coordinated with West Virginia Department of Natural Resources biologists during final design.

The concentrations of chemical and physical constituents that are presently in the water will be changed by the reservoirs. Temporary storage of water will tend to detain materials and provide time for reactions to take place. All materials that affect water quality exist in low quantities, so these changes will not change the make-up of the aquatic environment. Nutrients will be detained and undergo partial oxidation within the pools. However, under the conditions that will exist, an increase in water fertility will improve the aquatic environment. Nutrients near reservoir bottoms will result in a benthic zone rich in biological activity in the form of detritus feeders and decomposer organisms.

Surface water temperatures of impounded waters are expected to increase 5-10 °F above present stream temperatures in late summer which will be favorable for largemouth bass and bluegill production. Thermal stratification, at least of short duration, will occur. Water quality and normal stream flows of watershed streams are expected to remain essentially unchanged, except for reductions in flood flows and sediment concentrations. Dissolved oxygen levels of released waters will approach saturation levels, which will maintain normal stream conditions.

The proposed recreational impoundment will provide high-quality water-related recreational activities not presently found in the watershed. Multiple-purpose Structure No. 16 is designed to provide 50 acres of water for recreational use with facilities for fishing, boating, picnicking, swimming, camping, and walking for pleasure. Calculated estimates of annual visits for all activities is 105,750 with a design capacity of 1,200.

Although the Soil Conservation Service encouraged public access at all proposed impoundments, the decision of the local sponsors was not to provide public access, because of the following reasons: (1) increased landrights costs, (2) cost of minimum basic facilities, (3) increased O&M cost, (4) potential for increased liability, (5) increased delays in project installation. Sponsors will take necessary steps to exclude the public to prevent development of unsanitary conditions and pollution.

Installation of floodwater retarding structures on the landscape may be either aesthetically pleasing or displeasing, depending on individual viewpoint. The vegetated structures will present a view compatible with the overall scenic setting of the area and impounded waters will add aesthetic variety.

Installation of structural measures will create temporary interruptions of traffic, electrical power, telephone communication, and natural gas distribution. Installation will require the relocation of 11 residences, one small cemetery, approximately 5 miles of road, and 10 miles of electric and telephone lines. Construction operations will also cause temporary increases in noise, turbidity and sediment concentrations in streams, erosion of construction sites, and dust and smoke pollution of air. Even though all practical means will be used to reduce sediment during construction, it is expected that sediment concentrations will increase by .18 percent (60 tons/year) during the construction period.

Increases in numbers of people in pursuit of recreation opportunities will create increases in traffic, vehicular noise, fire hazard, litter, solid waste, and safety hazards associated with water-oriented recreation.

A 36 percent reduction in annual sediment yield from the watershed will occur as a result of the retention of sediment behind the proposed dams. The future sediment yield from the watershed with structures installed is estimated to be 122 tons per square mile, reduced from 188 tons per square mile. A decrease of 12,100 tons of sediment annually will improve water quality downstream from the watershed.

After structural measures are installed, a minimum 5-year level of flood protection during the growing season will be afforded an estimated 476 acres in the flood plain of Lost River. Based on measured project effects, the estimated average annual flood damages to crops, pastures, and other agricultural improvements will be reduced by about 88 percent. Land use in the areas where flood protection is provided is expected to undergo change. The following table is an estimate of the percent land use change in flood plain areas of Lost River as a result of increased flood protection:

Flood Plain Use Present Conditions		Flood Plain Use With Project	
Hay	27%		17%
Pasture	27%		16%
Corn	34%		58%
Wheat	5%		3%
Recreation-Camping	-		3%
Miscellaneous	7%		3%

About 60 acres of wildlife habitat will be lost on the 3 percent of miscellaneous flood plain land expected to be used for recreation-camping.

Although the flood plain will be more intensely used with the project installed, reduction of flood stages will result in net decreases in flood plain erosion and it is expected that nutrient and sediment transport will be reduced over present levels.

Sediment, scour and streambank damage will be reduced by over 60 percent through installation of structural measures. This decrease is expected to benefit fish habitat through reduction in bedload movement and reduction in the need for landowners to engage in annual stream channel restoration work.

The project will reduce flood and sediment damage repairs to public roads, bridges and culverts, fences, and other fixed improvement. Savings will accrue to individual land and property owners, to the watershed, and the general public. Beneficiaries in the region are estimated to be 4,800; of these, 2,000 are watershed residents. Direct agricultural damage will be reduced by 76 percent. Disruptions of traffic by floods will be virtually eliminated throughout the watershed. The 100-year-frequency flood, with project installed, will be approximately 2.5 feet below the first floor of South End Grocery in Mathias. At this level, some 10 existing, low-lying buildings such as garages, barns, and chicken houses may still be subject to flooding. Commercial properties located on the main stem of Lost River in Mathias will continue to receive structural damage with the project installed. Further development in the lower area of Mathias is discouraged.

A 36 percent reduction in annual sediment yield from the watershed will reduce downstream damages to the Potomac River and Estuary. Damages to metropolitan water supply, navigation, commercial fishery, boating, and aesthetics of the Nation's river would be reduced by entrapment of sediment behind proposed structures.

Works of improvement proposed in this Work Plan have been planned in accord with the National Historical Preservation Act of 1966. Installation of this project will not adversely affect any known archeological, historical, or scientific features. An investigation of the dam sites, conducted by the Archeology Section of the West Virginia Geological and Economic Survey, did not reveal any archeological or historical sites. If discoveries are made during the geologic investigations or during construction of structural measures, the Director, West Virginia Department of Archives and History and the National Park Service, will be notified. Constructions or investigations will cease until the proper arrangements have been made for salvage, protection, display, etc.

Economic and Social

At least 342 owners of existing properties will be benefited by flood-water reduction. An estimated 476 acres will receive a minimum of 5-year level of flood protection. This will permit landowners to more fully and effectively use flood plain land through use of improved crop varieties, more timely seeding, and harvesting operations and other cultural practices that tend to improve operating efficiency and farm income. Net annual returns from flood plain production are expected to increase by 30 percent or \$43,000.

Construction of the project will take place over an 8-year period. An estimated 100 man-years of employment will be filled from the labor market during the construction phase. Operation and maintenance of project measures will provide an estimated five permanent jobs. These new job opportunities will help reduce watershed unemployment and decrease the migration of young people to metropolitan areas.

Developed areas that are protected from flooding will have fewer dangers of drowning, disease, fire, and pollution. Individuals and properties protected will have financial resources available to them for other than flood damage repairs. These resources can allow an upgrading of living standards or working conditions. These factors will contribute to an increase in value of property in the protected flood plain. Total annual benefits from structural measures and land treatment are estimated to average \$539,400.

Conditions detrimental to the health and welfare of watershed residents will be reduced by controlling floodwaters. Goods produced in the watershed will be able to reach markets without delays caused by flooding. Workers who previously lost work when they could not reach their place of employment will benefit. Project installation will enable watershed residents easier access to hospitals and medical offices to protect their health.

Opportunities for future recreation will be created at the single-purpose flood prevention structure sites. However, public access, safety facilities, and sanitary facilities must be provided prior to development and use of these areas.

Completion of the planned project is anticipated to improve the overall quality of living in the watershed and develop a sense of community pride in watershed residents.

FAVORABLE ENVIRONMENTAL IMPACTS

- a. Reduce average annual agricultural flood plain damages by 88 percent.
- b. Reduce sediment yield leaving the watershed and entering Lost River and the Potomac Estuary by 12,100 tons annually.
- c. Land treatment on 94,750 acres of watershed land will reduce erosion, retard runoff, improve wildlife habitat, and enhance the aesthetic values of the watershed.
- d. Provide opportunity for an estimated 105,750 annual recreation visits by construction of a 50-acre lake and recreation development.
- e. Stabilization of 25 acres of critical area.
- f. Create approximately 167 acres of warm-water fishing and aquatic habitat. Waterfowl will use the lake occasionally as a rest area.
- g. Increase farm income through more intensive flood plain use by giving 5-year protection to 476 acres and applying conservation land treatment measures on all flood plain lands.
- h. Create approximately 100 man-years of employment and five permanent jobs.
- i. Stimulate rural economy by allowing more efficient and effective use of agricultural lands, eliminating market delays caused by flooding, and creating conditions that allow more working days.
- j. Improve fishery resources of the watershed streams by reducing the need for annual stream repair work.
- k. Create opportunities for incidental recreation.
- l. Improve the health and welfare of watershed residents by controlling floodwaters.

ADVERSE ENVIRONMENTAL EFFECTS

- a. Relocation of 11 residences and associated improvements required for installation of structures.
- b. Inundation of approximately 2.4 miles of free-flowing stream as a fishery and aesthetic resource.
- c. Inundation of approximately 292 acres of farmland and associated wildlife habitat.
- d. Invasion of privacy due to influx of outside people in search of recreation activities.
- e. Temporary increase in sediment and turbidity during construction.
- f. Increased vehicular traffic, noise, fire hazard, solid waste, and litter as a consequence of greater human use.
- g. Creation of safety hazard associated with water-oriented recreation.

ALTERNATIVES

Non-Structural

Land Treatment Alone

This alternative would provide technical assistance to keep conservation and woodland management plans up-to-date, to develop new plans as land ownership or land use changes, to maintain existing adequate cover and maintain installed land treatment measures, to plan and apply applicable treatment measures on land requiring treatment. Additional land treatment measures would be applied to adequately treat all of the lands of the watershed.

Land treatment would include conservation practices such as conservation cropping systems, critical area treatment, pasture and hayland management, forestry improvement, wildlife management, and other improvements as described under the land treatment measures of the planned project section.

The cost of the land treatment plan would be about \$470,500. This alternative plan would improve the hydrologic condition of the watershed, reduce flood flows by about 2.9 percent and provide a limited amount of fish and wildlife and recreation opportunity.

This plan would meet the selected objectives of the Sponsors for a land treatment program. The plan does not provide flood protection from the 100-year frequency flood to urban areas, nor does it provide 5-year frequency flood protection to agriculture land.

Land treatment would reduce the amount of sediment leaving the watershed by 1,000 tons annually. Both vegetative and structural types of land treatment measures would effectively reduce runoff, conserve soil moisture, and prevent excessive loss of topsoil. Many land treatment measures would enable landowners to more fully utilize sound land treatment practices to increase efficiencies of production, improve wildlife habitat, improve water quality, and improve aesthetics in the watershed.

Land treatment measures would not involve the relocation of any residences or improvements. Farmland, streams, and wildlife habitat would not be inundated by flood retarding structures. Watershed residents and vacationers would have to seek recreational opportunities associated with impounded water outside the watershed. Any increases in traffic, noise, and litter associated with a recreational development would also be avoided.

Land Treatment, Floodproofing, and Flood Insurance

For this alternative, the land treatment program would be installed, as many homes and businesses floodproofed as practical, and flood insurance would be made available to eligible property owners. The benefits and impacts of the land treatment program would be realized.

Floodproofing would be required for 23 dwellings and nine commercial establishments that are located on the flood plain. Each building would need to be altered in such a way that property damage would not occur from the 100-year frequency flood.

Future flood plain improvements would be restricted to projects that would not contribute to the flooding problem nor be susceptible to flood damage. Floodproofing would require the construction of a wall around existing properties and would cost a minimum of \$10,000 per property. Cost of this measures would be borne by watershed residents. Total cost would be approximately \$320,000.

It would not be practical to floodproof such properties as roads, bridges, most outbuildings, fence, livestock, and poultry, and these items are not eligible for flood insurance. Remaining direct annual damage on the Lost River flood plain, after all practical floodproofing, would amount to an estimated \$83,200.

In order to obtain flood insurance for this rural area, it would have to be approved for participation in the National Flood Insurance Program administered by the U. S. Department of Housing and Urban Development. The area would be required to adopt flood plain zoning ordinances. Flood insurance would reimburse participating landowners for financial loss from flood damages according to the guidelines of the insurance program. Total cost of developing, administering and enforcing the flood plain zoning ordinances is estimated to be about \$20,000 per year.

Through the imposed land use controls, future development of the flood plain would be restricted. The existing development on the flood plain would remain essentially the same.

Value of all property subject to flood damage, including recognized damageable properties below the Lost River Watershed, is estimated at \$9,912,400. Eligible for flood insurance would be properties with a value estimated at \$2,011,000. This amounts to 22 percent of the total and includes dwellings, commercial establishments, and most of "other agriculture." The annual subsidized premium cost would be about \$7,000. At non-subsidized rates, the annual cost would amount to approximately \$70,000. Technical inputs for a flood insurance study would cost about \$30,000.

If all legitimate claim awards are paid in full over the life of the project, the cost of flood insurance would approach an amount equal to average annual damage without a project; \$133,700 for the insurable items. Purchase of subsidized flood insurance by residents would provide a means of recovering a portion of flood losses.

The insurance payments for flood damages incurred by participants in the program provide reimbursement for the value of property and contents damaged. Payments would not be adequate, however, to totally replace the item destroyed or damaged, nor provide for such related items as cleanup, inconvenience, and other indirect damages.

Ineligible for flood insurance would be properties with an estimated value of \$7,181,400. This amounts to 78 percent of the total and would include such items as roads, bridges, growing crops, pasture, fences, lawns, shrubs, trees, livestock, poultry, and land. Stream-banks are not insurable and value of this item is not included above. Direct average annual damage to non-insurable items is estimated at \$105,600.

This alternative would not lower the 100-year frequency flood in the urban area nor have any effect on the flooding of agriculture land. The adverse environment effects of the planned project which would be avoided if this alternative is implemented, would be the same as those listed under the "Land Treatment Alone" alternative.

Floodproofing structures around residences would detract from the high quality aesthetics of the watershed. Continued flood damage and restriction of more intensive flood plain use would curtail economic development of Lost River Watershed. This alternative would meet the Sponsors' objective for a land treatment program but would not provide flood protection to agricultural land or provide needed recreation facilities. Total cost of this alternative is \$2,356,500.

Structural

Land Treatment and Recreation Only

A single-purpose reservoir to supply needed recreational opportunities would be constructed similar to proposed site 16. This development would create a 50 acre recreation lake and supply 164,700 annual visitor days.

The dam could be built with a water level control feature to manage aquatic habitat more effectively. This development would provide fish and wildlife habitat improvement.

There would be increases in noise, sediment concentrations in streams, smoke and dust pollution of air, and accelerated erosion during construction activity. Vehicular traffic, noise and litter would increase as a consequence of greater human use. Installation of the structure and associated facilities would require the relocation of three residences, would inundate 50 acres of farmland and associated wildlife habitat, and would eliminate 0.6 miles of stream. This alternative would meet the Sponsors' objectives of land treatment and recreation but would not provide flood protection to agricultural lands.

This alternative would cost approximately \$1,236,400 of which \$765,900 would be for the single-purpose structure.

Land Treatment, Stream Channel Modification, and Diking

This alternative consists of approximately 15 miles of channel work, diking, riprap, and bridge underpinning.

Total cost of this alternative would be about 15 million dollars.

It would provide 100-year frequency protection to the urban areas and 5-year frequency protection to agriculture lands.

The benefits and impacts of the land treatment program would be realized. Approximately 15 miles of high-quality, free-flowing streams would be removed as a fishery and aesthetic resource. Installation of structural measures will create temporary interruptions of traffic, electrical power, telephone communication, and natural gas distribution. Construction operations would also cause temporary increases in noise, turbidity and sediment concentrations in streams, erosion of construction sites, and dust and smoke pollution of air.

Installation of this alternative would not require the relocation of any residences. Higher peak flows resulting from channel work would induce downstream damages. Water-based recreational activities would be reduced in the watershed. Structural measures proposed in this alternative would disrupt the rural aesthetic setting of the watershed.

Land Treatment, Floodwater Retarding Structures, and Recreation

In this alternative, 20 reservoir structures rather than five were considered from the standpoint that a higher level of flood prevention could be achieved. They were designed essentially the same as those included in the planned project.

The combined cost for these structures is about \$22,500,000.

This structure system would provide 100-year frequency flood protection to most residences and approximately 25-year frequency flood protection to the flood plain.

About 1,800 acres would be committed to this project for sediment pools, retarding pools, recreation pool and facilities, dams, emergency spillways, and borrow areas. Approximately 9 miles of stream channel would be eliminated with this alternative.

There would be noise, water and air pollution, and accelerated erosion during construction activities. The Sponsors' objectives of land treatment and flood protection to agricultural lands would be realized. Downstream sediment damage to the Potomac River and Estuary would be reduced. Approximately 465 acres of warm-water fishing and waterfowl habitat would be created. Installation of these structural measures would require the relocation of approximately 35 residences.

Flood Plain Purchase

The initial cost of buying all properties, inclusive of relocation payments and severance damage, is estimated at \$6,885,100. Marketable agricultural commodities produced on the flood plain have an estimated net annual value of \$145,000. If capitalized at current interest rates for the period of the project, the present value is \$2,575,800. Addition of this opportunity-cost would bring the overall price of flood plain purchase to \$9,460,900.

In 1971, the assessed value of all Hardy County real estate amounted to \$15,347,955. The average ratio of assessment to market value was 0.358 and the average tax rate per \$100 was \$1.41. At this rate, public acquisition of the affected flood plain properties would reduce the tax revenue of local governments and school districts by an estimated \$24,700 annually.

Replacement of prime flood-free agricultural land equivalent to the Lost River flood plain would be impossible in West Virginia.

No Project

The final alternative considered for Lost River Watershed was that of "no action." If the project is not considered, there would be no concentrated activity directed toward solving the water and related land resource problems that exist in the watershed.

At the present, there is an on-going land treatment program in Hardy County. A portion of this effort is applied to the lands in the watershed. About \$13,900 is spent each year to carry out the on-going land treatment program. This includes the cost to install the treatment measures and for technical assistance. It would be expected that this activity would continue at the same rate as the present.

The net annual monetary benefits that would be foregone, if the planned project is not implemented, are \$103,300.

If no project is considered for the watershed, the serious resource problems, need for public recreation and stimulation of economic condition that the Sponsors are trying to solve, would remain the same.

All of the adverse environmental effects of the planned project would be avoided.

SHORT-TERM vs. LONG-TERM USE OF RESOURCES

Agriculture is expected to remain an important segment of the economy in the watershed for the foreseeable future. The acreage per unit will probably decrease for the part-time farms, with the full-time units becoming larger and more efficient. The following table summarizes the expected land use trends for the watershed:

	<u>Present Use</u>	<u>Future Use Without Project</u>	<u>Future Use With Project</u>
Forest land	74%	76%	75%
Grassland	17%	16%	15%
Cropland	8%	7%	9%
Other	1%	1%	1%

No changes in land use are proposed which will significantly restrict options for future use or limit productivity. Structures, reservoirs, and borrow areas will preclude optional use of 0.6 of 1 percent of the watershed area. On the remaining 99.4 percent, opportunities for productive use will be maintained or enhanced. The project will reduce options for long-term land use only on areas incorporated into the dams, spillways, sediment pools, and flood pools. It is compatible with the long-term land use trends of the adjacent land resources and will help to build more stability into the economic system. Ground water resources and air resources are not expected to be impaired.

Usefulness of structural measures for protecting downstream areas will continue beyond the 100-year effective economic life of the sediment pools. The structures will become slightly less efficient as sediment accumulates in that space reserved for flood storage. Flood protection will not decrease significantly after 100-year period because the rate of sediment accumulation will be low, and the amount of flood storage is high. Most of the sediment will pass through the structure after its economic life. However, periodic removal of sediment from the sediment pools could restore the trap efficiency of the structures thereby allowing them to continue to function as sediment traps and flood prevention structures indefinitely. If this accumulated sediment is not removed, a fresh water marsh will eventually develop in the sediment pool.

Over 12,000 acres of the area is in the George Washington National Forest, managed by the U. S. Forest Service. This area will remain in public ownership and use. Most of the privately owned lands on the steep upstream areas will remain in woods and serve as rural retreats for urban residents.

The project is not expected to correct any environmental problems on a short-term basis. Pollution due to sediment, dust, and smoke is likely to occur during construction but will cease upon completion of the project.

Cumulative environmental effects within the watershed will include the improvement of water quality and wildlife habitat. These amenities are due to the effect of land treatment and to the reduction of stream turbidity.

The completed project is expected to be effective in conserving land and water resources long after its designed life. The degree of flood prevention will remain high if land use changes do not substantially alter hydrologic conditions. Sediment control will continue long after the designed life of the structure, especially if hydrologic conditions are improved beyond those proposed in this project or if sediment is removed from the storage areas provided at each site.

This plan provides a level of protection consistent with the needs and objectives of present and anticipated use of the flood plain lands. It provides protection to some of the most productive and easily managed land in the watershed and will aid in the orderly development of the natural resources of the area since consideration is given to conservation and environmental measures to preserve the lands for use by future generations. The structural measures are evaluated for a 100-year period.

Eight Public Law 534 watershed projects, comprising about 1,310 square miles of total drainage area, have been approved for installation in the Potomac River Basin. Installation is complete in one of the projects, two are substantially complete, and installation in three others is making good progress. Lost River and seven of the approved projects are on tributaries of the Potomac River.

Structures in these projects provide for 10,887 acre-feet of sediment storage, 105,170 acre-feet of floodwater detention storage capacity, 1,144 acre-feet of municipal and industrial water storage for local use, and 2,438 acre-feet of recreation storage.

Storage reserved for sediment in the structures built and proposed will reduce the amount of sediment entering the Potomac River main channel and estuary about 205,200 cubic yards per year. Current removal cost of this amount of sediment would be about \$615,000 annually. Storage provided for floodwater detention storage capacity in these structures amounts to about 3.5 inches of runoff per acre controlled.

The eight approved projects for improved conservation land treatment measures cover about 7 percent of the total Potomac River Basin land area.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

A total of 735 acres are required for structural measures and recreation. The 735 acres are broken down as follows: 143 acres for sediment pools; 292 acres for retarding pools; 148 acres for recreation pool and facilities; and 152 acres for dams, emergency spillways, and borrow areas. Elimination of 2.4 miles of stream channel will occur with installation of the structural measures.

Agricultural and incidental upland wildlife use will be eliminated from about 291 acres to be inundated by the reservoirs. Flooding of 292 acres in the detention pools will periodically interrupt agricultural and incidental wildlife use of these areas for limited periods.

CONSULTATION WITH APPROPRIATE FEDERAL AGENCIES AND REVIEW BY STATE AND LOCAL AGENCIES DEVELOPING AND ENFORCING ENVIRONMENTAL STANDARDS

General

The application for assistance under authority of the Flood Control Act of 1944 was submitted to and approved by the State agency designated by the Governor of West Virginia.

State, Federal, and local agencies were notified that planning was authorized and were invited to participate in the planning process. Federal agencies notified were: Forest Service, Agricultural Stabilization and Conservation Service, Department of the Army, U.S. Geologic Survey, Environmental Protection Agency, U. S. Fish and Wildlife Service, Office of Economic Opportunity, Bureau of Outdoor Recreation, and Farmers Home Administration. State agencies notified were: Department of Highways, Department of Health, Department of Natural Resources, State Soil Conservation Committee, and Department of Archives and History. Local utility companies contacted were: Atlantic Seaboard Corporation, Shenandoah Valley Electric Corporation, Hardy Telephone Company, United Fuel Gas, and Potomac Edison Company.

The watershed work plan has been coordinated with the West Virginia Antiquities Commission and the Archeology Section of the West Virginia Economic and Geologic Survey. Investigations indicate that installation of the project will not encroach on any known archeological values or any historic site. If artifacts or other items of archeological or historical significance are uncovered before and during construction, construction will not begin or continue until the Director, West Virginia Department of Archives and History and the National Park Service are notified, and a course of action agreed to between the Sponsors, the Service, and responsible agencies is implemented. Should detailed investigation, salvage, or mitigation be necessary, appropriate arrangements will be made between the Sponsors, Soil Conservation Service, and U. S. Department of the Interior, National Park Service. Provisions of the Reservoir Salvage Act will be followed.

Numerous news articles appeared in local newspapers relating to activities and information concerning the Lost River Watershed Project. Several local meetings and a public hearing were held to be sure that every person in the county would have the opportunity to express their feelings regarding the project. A public informational meeting was held in March 1969, and a public hearing was held in June 1971.

The work plan and the environmental impact statement have been prepared considering all the comments and recommendations provided by the Sponsors and other interested State and Federal agencies.

The following agencies were asked to comment on the draft environmental impact statement and work plan, and they responded as follows:

Department of the Army	Responded
Department of Commerce	Responded
Department of Health, Education & Welfare	No Response
Department of the Interior	Responded
Department of Transportation	Responded
Environmental Protection Agency	Responded
Advisory Council on Historic Preservation	Responded
Appalachian Regional Commission	No Response
Ohio River Basin Commission	No Response
Federal-State Relations Office (State Clearing House)	No Response
State Soil Conservation Committee	Responded
West Virginia Department of Natural Resources	Responded

In an effort to resolve issues and provide adequate response to comments received during the Inter-Agency review of the draft environmental impact statement, the Soil Conservation Service held two meetings with the U.S. Environmental Protection Agency and one meeting with the U.S. Department of the Interior. The meetings with EPA were held in their Regional III office in Philadelphia, Pennsylvania on February 1 and March 20, 1974, and with the Department of the Interior on April 10, 1974 in the Northeast Regional office in Boston, Massachusetts. Pertinent comments were thoroughly discussed in an effort to clarify objections and concerns raised by EPA and the Interior. These discussions were very fruitful in that a good understanding was reached for properly responding to each comment.

Discussions and Disposition of Each Problem, Objective, or Issue
Raised on the Draft Environmental Statement by Federal, State, Local
Agencies, and Others

U. S. Department of the Army - Corps of Engineers

- (1) Comment: Is the operational and maintenance cost of \$2,100 annually for Structures No. 4, 10, 23, and 27 correct? This figure seems grossly out of line with the scope of work listed on page 8, paragraph 3, EIS. Compare with figure of \$30,200 annual operation and maintenance cost of multiple-purpose structure at site No. 16.

Response: Based on experience from 124 dams that have been built in the last 20 years in West Virginia, the operational and maintenance cost has ranged from \$300 to \$450 per site for single-purpose dams. The cost used for Lost River Watershed was \$525 per single-purpose dam.

Estimated average annual operation and maintenance costs of the multiple-purpose Structure No. 16, and operation, maintenance, and replacement cost of the recreational development is \$30,200. Common items of maintenance for the multiple-purpose dam will be the same as those listed for the single-purpose structures. This cost consists of an estimated \$500 annually for the maintenance of the dam, emergency spillway, and reservoir area and \$29,700 annually to cover replacement costs of recreational facilities, salaries of operating personnel, sanitation, and safety in the recreation complex.

- (2) Comment: What is the percentage of Class V soils as is described on page 13, paragraph 4? Are they incorporated into another category in the chart on page 12, or are they nonexistent in the project?

Response: Concur. A statement has been added on page 22, paragraph 2 indicating there are no Class V soils in the watershed.

- (3) Comment: Page 30, paragraph 1, should read "nine million people" instead of "one million."

Response: Concur. Changed "one million" to "nine million."

- (4) Comment: What will the long term (10 year +) effects of aquatic eutrophication be on suggested farm ponds due to resulting higher water temperature and still water? Are these

closed water bodies, or will they be nodes along a moving water system?

Response: Approximately 18,000 farm ponds have been built in West Virginia, and aquatic eutrophication has not been a major problem. The Soil Conservation Service provides technical assistance to help manage them.

The farm ponds are both closed water bodies and nodes along moving water systems.

- (5) Comment: No mention is made in the EIS text of relative pool elevations and then visual impacts at levels of maximum flood, mean flood, conservations, and recreation stages.

Response: The sediment (conservation) and recreation pools will not be drawn down during any period of the year. The maximum flood storage (100-year frequency) will be emptied from all structures within a period of 2 to 6 days. The visual setting of the conservation and recreation pools will be enhanced by vegetative plantings on all areas disturbed during construction. The visual impact is expected to be pleasing to most observers since the impoundments will add resource variety (i.e. flat water) that is not presently found in the watershed. Maximum flood pool levels will temporarily inundate some vegetation (mostly grasses) and consequently may degrade the aesthetic setting. However, observation based on 124 similar structures built to date in West Virginia has revealed no lasting detrimental effect on plant life in the temporary flood storage areas. Any visual damage that occurs to the structures or vegetation will be repaired by the Sponsors as a part of the operation and maintenance program.

- (6) Comment: The report is rather weak in its discussion of visual amenities and opportunities. The project area appears to be rich in scenic value, and warrants more consideration, i.e., how will scenic qualitties be enhanced and if so, how will they be enjoyed?

Response: This is discussed on pages 18, 31, and 45 of the statement.

U. S. Department of Commerce

- (1) Comment: Pages 17-19. We note that major wildlife species, a variety of finfish species, and several aquatic insects are listed in this section. However, no mention is made of other organisms that may be found in Lost River Watershed such as reptiles, amphibians, and invertebrate species other than the aquatic insects mentioned. The list of species inhabiting this area should be expanded to include these other organisms, giving attention to the presence of rare or endangered species. A list of threatened fishes, reptiles, amphibians, birds, and mammals is included in Threatened Wildlife of the United States (1973 Edition), and rare and endangered mollusks are included in Proceedings of a Symposium on Rare and Endangered (Naiads) of the U.S. (1971), both published by the Fish and Wildlife Service, U.S. Department of the Interior.

Response: Concur. Additions have been made on page 28.

- (2) Comment: Page 19. The table at the top of the page contains several errors: the "northern sulpin" incorrectly listed under Cyprinidae, should be listed under Cottidae; the "creek chub," incorrectly listed under Catostomidae, should be listed under Cyprinidae. Furthermore, the "glassjaw minnow" is not listed in the American Fisheries Society Special Publication No. 6, "A List of Common and Scientific Names of Fishes from the United States and Canada" (Third Edition) (1970). This species should be correctly identified in the final Environmental Impact Statement.

Response: Concur. Corrections have been made on page 28.

- (3) Comment: Page 43. It is stated that the economic life of the project will be 100 years, at the end of which time the structures may be removed. If these structures are removed, the sudden release of the impounded sediments would have an adverse environmental impact; such a possibility and its effects should be discussed.

Response: It is not anticipated that the structures will be removed at the end of a 100-year period. Paragraph 3 on page 57 of the Statement has been revised to reflect what will likely occur.

U. S. Department of the Interior

- (1) Comment: Structural Measures - This section should be expanded to indicate the volume of flow expected from each impoundment under the various flow conditions expected.

Response: The Statement has been modified on page 7, para. 3 to include more information on flow volumes. The volume (peak rate) of flow for high and low stages is listed in Appendix A of the Statement.

- (2) Comment: On page 7, para. 6, the 735 acres required for structures and facilities should be broken down into land use types as they presently exist.

Response: The Statement has been modified on page 12, para. 3, to include a table which shows by various land uses the 735 acres for present and future conditions.

- (3) Comment: Environmental Setting - Page 12 - In discussing Land Capacity Classes I and II, it is stated that the soils may be used safely; however, these soils are in the flood plain and cannot be used safely. If they could, there would be no justification for a project. This contradiction should be explained.

Response: Considerable Class I and II land, while in the flood plain, is not subject to flooding by the 100-year event. The planned project, when installed, will greatly reduce the frequency and extent of flooding to most flood plain lands. The word "safely" as used here refers to the fact that certain flood plain lands in Classes I and II can, with ordinary management practices to maintain soil fertility and structure, be used "safely" for intensive agricultural production without permanent damage to the basic soil resources.

- (4) Comment: Hardy County mineral production is limited to small quantities of stone. The Work Plan, page 3, and the Statement, page 14, mention that "gas is produced from scattered wells in the central part of the watershed." We suppose that these wells are those in the Lost River gas field that has been, or is being, converted to gas storage. Wells in this field and in two nearby fields found gas in structure traps at about 8,000 feet deep

in the Oriskany Formation. Of more importance, the report and statement should point out that the 25,000 feet of sedimentary rocks, and very possible 35,000-40,000 feet with repeated thrust faulting, have good possibilities for deeper structural and stratigraphic trap deposits. Although some earlier seismic work and wide-spaced drilling has been done, the area needs to be tested by newer seismic techniques and additional holes.

In any event, the plan and statement should clarify whether the existing wells - production or storage - the gas transmission line crossing the area, and deeper exploration will be affected by the project.

Response: The above information has been added to page 23, para. 5 of the Statement and to page 3, para. 6 of the Work Plan.

Existing wells are not affected nor is it anticipated that deeper exploration will be affected by the project. A gas transmission line will be infrequently flooded at Structure No. 27. (See page 9, para. 2 of the Statement.)

- (5) Comment: A minor observation is the possible incorrect use of "dendritic" in reference to the drainage pattern, para. 3, page 14; to the U.S. Bureau of Mines, instead appears as a classic "trellized" drainage pattern.

Response: Concur. Changed dendritic to trellis.

- (6) Comment: Page 25, last paragraph - This paragraph discusses erosion related to scour channels, but fails to identify the cause. It should be noted that such phenomena are natural occurrences in flood plains and that erosion only results when such areas are put to uses inconsistent with their limitations. In this case, cultivation in the flood plain is the cause. With natural vegetative conditions, erosion would not have occurred. This is similarly true for stream bank erosion where conditions have been aggravated by poor land use practices.

Response: Scour damage occurs primarily from out-of-bank and overland flood flows. Erosion, scour damage, and streambank erosion can, and does occur under completely natural conditions. This is true for all types of vegetative cover including heavily forested flood plains. It is true that natural vegetative conditions can and do reduce scour, but seldom does even the best vegetative cover provide conditions where scour would not have occurred.

- (7) Comment: The treatment of project effects on fish and wildlife resources is conclusionary and incomplete. The loss of 735 acres of habitat for project structures and facilities is cited as insignificant; however, some species such as deer are already approaching or exceeding the limits of the watershed-carrying capacity as noted on page 30. The loss of any portion of their range under such conditions is extremely significant. This should be noted. Additional habitat loss can also be expected as the result of secondary development. This section states that waterfowl habitat will be created by the impoundment. Due to the expected low productivity of the reservoirs and the fact that this area is away from the major flight path of migratory waterfowl, this is highly unlikely.

Response: Of the total 735 acres required for installation of flood retarding structures, only 193 acres will be inundated by permanent pools, which is less than 0.5 of 1 percent of the total habitat in the watershed. The remaining 444 acres will be required for dams, spillways, borrow areas, and temporary flood pools. As stated on pages 8 and 44, these areas will be revegetated with selected grasses, legumes, and shrubs in accordance with West Virginia Department of Natural Resources recommendations to provide wildlife habitat, particularly forage for deer. Of the 193 acres inundated, 150 are pastureland, 13 are cropland, and 30 are woodland (page 38). Population estimated for deer (page 44) are 0.03 deer per acre of woodland, 0.0031 for cropland, and 0.0031 for pastureland. This amounts to habitat for 3.06 deer. Paragraph 1 on page 44, and paragraph 1 on page 8 have been revised to reflect this information.

In addition, proposed land treatment measures on 94,750 acres of watershed lands are expected to greatly benefit wildlife habitat. Practices such as cover crops, liming and fertilizing, grass-legume meadows, stubble mulching, pasture improvement, tree planting, protecting woodland from grazing, wildlife watering facilities, and wildlife food plots will benefit not only deer but all wildlife in the watershed.

Extensive secondary development as a result of project measures is not expected in the watershed. As indicated on page 46, about 3 percent of the flood plain is expected to be used for recreation-camping. This land is presently classed as miscellaneous land and amounts to about 60 acres on which additional wildlife habitat will be lost. Additions have been made on page 47 to reflect the above information

Although Lost River Watershed is not located along a major waterfowl flight path, this area of West Virginia is located in the fringe of the Atlantic Flyway. A variety (but limited numbers) of waterfowl such as Pintail, Green Wing Teal, American Widgeon, Gadwall, Shoveler, Ringneck Duck, Scaup, Black Duck, Mergansers, and Canada Goose have been observed to use reservoirs and streams as rest areas in the area during migrations.^{1/} Wood and mallard ducks are known to nest in the area and provide a limited amount of waterfowl hunting in the fall.^{2/} The U.S. Bureau of Sport Fishery and Wildlife has identified the Potomac River system as a major water area significant to waterfowl.^{3/}

- (8) Comment: The assumption is also made that each of the impoundments will support a fishery. However, no justification for this assumption exists. Expected increases in water temperature amounting to 10°F above that expected in the streams in late summer are indicated. The impoundments will be extremely low in productivity. The lakes are not expected to stratify, and low dissolved oxygen will be found at the bottom. Each of these factors presents an impediment to the establishment of a significant fishery. We believe that a full discussion should be included to clarify these points, and to permit judgement to be made as to whether or not a significant fishery will establish and, if so, what type and quality it will be.

Response: The assumption that the impoundments will be extremely low in productivity and that temperature increases and low dissolved oxygen near lake bottoms will be detrimental to the establishment of a significant fishery, is unsupported. Adequate justification exists for the assumption that the impoundments will support a significant fishery. The statement has been modified on page 45 to clarify this.

1. According to U. S. Bureau of Sport Fishery and Wildlife data, 534 acres of reservoirs in the Eastern Panhandle Region of West Virginia (B-3) provided 16,340 man-days of fishing in 1964.^{3/}

^{1/} Waterfowl Observations on PL-566 Reservoirs, Notes of Mountaineer Chapter of National Audubon Society, 1973.

Telephone conversation with Mr. Charles Conrad, Executive Director Brooks Bird Club, Wheeling, WV. (5/28/73).

Telephone conversation with Dr. George Hall, Editor of the Wilson Bulletin, (5/29/73).

^{2/} Potomac River Basin Report, Volume IV, Appendix J, Fish and Wildlife Resources, 1962.

^{3/} Water Resources in Appalachia, Appendix G, USDI Bureau of Sport Fisheries and Wildlife, May 1969.

2. Water quality of the stream to be impounded, Lower Cove Run, is favorable for fish production (see page 26). Water quality criteria publications state that it is generally recognized that the best waters for the support of diversified aquatic life are those with pH values between ⁷ and 8, having a total alkalinity of 100 to 120 mg/l. ^{4/}

3. Thermal stratification, at least of short duration, with development of thermoclines, will occur. Nutrients near reservoir bottoms will result in a benthic zone rich in biological activity in the form of detritus feeders and decomposer organisms. (See West Virginia Department of Natural Resources Comment No. 7.)

4. Increase in impoundment surface water temperature of about 10°F above expected stream temperatures will provide a more favorable environment for warm water species. Stream temperature in the watershed presently range from 65°F to 80°F during summer months which restricts cold-water fishing, and is marginal for warm water fishing. Impounded surface water temperatures are expected to range from 65°F to 88°F during summer months, which will be more favorable for largemouth bass and bluegill production. West Virginia Department of Natural Resources fishery biologists indicate that the impoundment also has potential for spring trout stocking.

5. Fish production of present watershed streams is 203 pounds per acre. ^{5/} West Virginia Department of Natural Resources fishery biologists estimate that fish production in the proposed impoundment will be at least 170 pounds per acre. West Virginia Department of Natural Resources, Division of Wildlife Resources, will provide fishery management for the impoundment which will include stocking of trout for spring and fall fishing, stocking, and management of a largemouth bass-bluegill population, annual fish population survey, and restocking or removal as needed. Management may also include a fertilization program if the need is indicated by post-impoundment studies. The proposed impoundment will provide an estimated 3,750 man-days of fishing annually. The 50-acre lake will have 8 acres of water that is 0-4

^{4/} Water Quality Criteria, publication No. 3-A, State Water Quality Control Board, California, 1963.

^{5/} Sullivan, C.R., Population Manipulation Studies on West Virginia Smallmouth Bass Streams, DJ Project F-1-R (1-5), West Virginia Conservation Commission.

feet deep, 9 acres, 4-10 feet deep, and 33 acres from 10 to 35 feet deep. Additions have been made on paragraph 3, page 10, paragraph 1, page 16 of the EIS, paragraph 1 page 30, and paragraph 1, page 43 of the Work Plan to reflect management responsibilities.

- (9) Comment: No discussion is given on the effects of the project on downstream fisheries. This is a significant factor in evaluating the projects and data should be presented here, noting the expected qualities and quantities of downstream releases.

Response: Construction of the dams will create an increase in sediment concentrations (about .18 percent annually during construction) in Lost River, which will temporarily reduce fish food and fish growth in the stream. This will be a temporary situation, and will not create any long-term or permanent damage to the fishery. In the long run, the project will actually improve fish habitat through the reduction of 12,300 tons of sediment deposition annually. The project is also expected to benefit downstream fish habitat through reduction in bedload movement, and reduction in the need for landowners to engage in annual stream channel repair.

Water quality and normal stream flow of watershed streams are expected to remain essentially unchanged, except for reductions in flood flows and sediment concentrations. Based on West Virginia Department of Natural Resources recommendations, cold water outlets have been added to sites Nos. 4 and 16 to protect the cold water fishery of Lost River. Prior to construction, West Virginia Department of Natural Resources biologists will recommend the level from which cold water will be drawn to maintain normal stream temperatures. Aeration of water discharged from impoundments will occur as the water flows through the principal spillways. Dissolved oxygen levels of released waters will approach saturation levels, which will maintain normal conditions of streams below impoundments. For additional information, refer to the response for Comment 1 of the U.S. Department of the Interior.

- (10) Comment: The discussion on sedimentation fails to substantiate the claim that erosion and sedimentation will be reduced in spite of increased agricultural activity in the flood plain. Calculations with present and future land use predictions indicate that erosion in the flood plain will increase by well over 6,000 times per year. Most of the sediment can be expected to enter the waterway. In addition, scour erosion will increase whenever the flood plain is inundated because of this more intensive utilization.

Response: Information relative to this comment can be found on page 43, paragraph 3, and page 46, paragraph 1 of the Statement. Land treatment measures will reduce the amount of sediment leaving the watershed by 1,650 tons annually, and the floodwater retarding dams will provide for a further reduction of 12,100 tons annually. The dams will reduce scour damage in the flood plain by 55 percent due to decreased frequency and depth of flooding.

In the above comment, we assume that 6,000 times is meant to be 6,000 tons. However, according to our estimates, the erosion rate on the flood plain could increase by 3,000 tons per year. This assumes continuous cultivation, and an erosion rate of 6.5 tons per acre per year which is much lower than the average of 18 tons per acre per year on cropland for the entire watershed. Most of this sediment is not expected to reach the waterway. On slopes as gentle as those in the flood plain, delivery ratios are very low. The erosion rate simply indicates a rate of movement of soil particles due to the impact of rainfall, and in no way implies the amount of soil actually leaving a site.

The net effect of land treatment measures, floodwater retarding structures, and increased erosion in the flood plain will amount to an overall reduction of about 12,100 tons for the entire watershed as shown on pages 46 and 49 of the Statement.

- (11) Comment: Favorable Environmental Effects - Either verify or delete item B, D, F, and L for reasons given above.

Response: Item B - Please refer to the response for Comment 10.

Item D - The following table, listing the design capacity (DC), the daily design capacity (DDC), and annual visitors (AV) for each activity planned for the recreation facility, has been added to page 11 of the Statement.

<u>Activity</u>	<u>DC</u>	<u>DDC</u>	<u>AV</u>
Picnicking	430	860	43,000
Camping	280	280	14,000
Swimming	450	900	45,000
Fishing	50	75	3,750

For further information relative to Item D, please refer to the response for Comment 1a of the U.S. Environmental Protection Agency.

Item F - The validity of this item is verified in the response to Comment 8 of the U.S. Department of Interior.

Item L - This is explained on page 47, para. 5 of the Statement. Also refer to the response to Comment 10 of the U.S. Department of Interior and to the response to Comment 1c of the U.S. Environmental Protection Agency.

- (12) Comment: Adverse Environmental Effects - Revise in line of comments given above.

Response: Response to Favorable Environmental Effects does not cause any changes in the listing of Adverse Effects on page 50.

- (13) Comment: Alternatives - Another alternative that should be more completely explored would be land treatment, flood-proofing, and flood insurance. This alternative would provide flood protection for all residents at a cost of under \$200,000 whereas the proposed project would spend over \$7 million for structural protection. Land treatment costs and effects would remain the same, but adverse impacts due to impoundments would be avoided with this alternative.

Response: This alternative has been more thoroughly explored and appropriate changes have been made on page 52 of the EIS. Twenty-three dwellings and nine commercial establishments could be floodproofed at a cost of \$320,000. However, it would not be practical to floodproof such properties as roads, bridges, most outbuildings, livestock, poultry, and crops. Remaining annual damage to these items would be \$83,200.

Value of all property subject to flood damage including recognized damageable property below the Lost River Watershed is estimated at \$9,912,400. Properties eligible for flood insurance have a value of \$2,011,000 which amounts to only 22 percent of the total value of all properties. Such items as roads, bridges, crops, pasture, fence, lawns, livestock, and streambanks are not insurable.

- (14) Comment: Omitted from consideration is the possibility of buying out the affected flood plain properties. This possibility should be thoroughly explored as it appears it might prove cheaper and more environmentally advantageous than the selected project.

Response: The initial cost of buying out all properties, inclusive of relocation payments and severance damage is estimated at \$6,885,100. Marketable agricultural commodities produced on the flood plain have an estimated net annual value of \$145,000. If capitalized at current interest rates for the period of the project, the present value is \$2,575,800. Addition of this opportunity cost would bring the overall price of flood plain purchase up to \$9,460,900.

In 1971, the assessed value of all Hardy County real estate amounted to \$15,347,955. The average ratio of assessment to market value was 0.358 and the average tax rate per \$100 was \$1.41. At this rate, public acquisition of the affected flood plain properties would reduce the tax revenue of local governments and school districts by an estimated \$24,700 annually.

Replacement of prime flood-free agricultural land equivalent to the Lost River flood plain would be impossible in West Virginia.

The above information has been added to page 55 of the Statement as an additional alternative called, Flood Plain Purchase.

U. S. Department of Transportation

- (1) Comment: The U. S. Department of Transportation has reviewed the Environmental Impact Statement for the Lost River Watershed Project, and we have no comments to offer nor do we have any objection to the project.

Response: None

U. S. Environmental Protection Agency

- (1) Comment : The method of calculating the benefit-cost ratio should be clarified in the final EIS.

Response: The method used for calculating the benefit-cost ratio is in conformance with Senate Document No. 97. For specific methodology used in the study, please refer to the Investigation and Analysis section of the Work Plan.

- (1a) Comment : Is there a need for flood control and recreation in this area? The lack of population and/or industrial concentrations in the basin makes a justification of the project very tenuous. There are recreational areas presently located in the region. The project is far removed from metropolitan areas and with present restrictions on travel it is very questionable as to the number of visitors that would make use of the "day use" facility.

Response: There is a need for flood prevention and recreation in this area. The watershed is within a 2-hour drive of the Washington metropolitan area. For more on population, see page 19 of the EIS.

A paragraph has been added to the Statement under Project Objectives and Purposes; it quotes land resource problems and recreational needs from the following major studies.

1. Potomac River Basin Report - 1963, printed in 1970 as House Document No. 91-343.
2. Report for Development of Water Resources in Appalachia-December 1969.
3. The National Inventory of Soil and Water Conservation Needs for West Virginia, updated in 1970.
4. North Atlantic Regional Water Resources Study - June 1972.
5. State Comprehensive Outdoor Recreation Plan (SCORP).

Also the water and related land resource problems and recreation needs are explained on pages 34, 35, 38, 39, 40, 41, and 42 of the Statement.

(1b) Comment : The discussion of the benefits and costs of agricultural production on the flood plain is not clear, for example the yield and value of corn the area could produce.

Response: Crop yields are discussed in paragraphs 1 and 2 of page 30. The value of agricultural crops is listed in the fourth paragraph of page 35 and damage reduction to crops is shown in paragraph 4 of page 46.

(1c) Comment : The costs assigned to dredging in the Potomac Estuary assumes that the sediment load from an adjoining watershed will be identical to Lost River Watershed, and that the entire load reaches to Potomac Estuary, which is not valid. Statistics for sediment load should be from the Lost River drainage area.

Response: Sediment yields were determined by on-site investigations for the Lost River Subwatershed. The second paragraph under Sediment Damage on page 39 of the EIS has been changed to reflect this. The gage in the adjoining watershed was only used as a check.

The environmental statement on page 39 states that "an unmeasured quantity of this sediment deposits in the Potomac River, but it eventually reaches the Potomac estuaries." This statement is simply recognition of normal, well-documented, geologic process of continuous and successive depositional and erosional events. It should be recognized that the materials being discussed are still suspended materials. That is, they are already in the transport medium and as long as that medium moves, materials suspended in it will also move. Materials normally thought of as "bedload" materials have not been measured and therefore are not included in the estimates provided.

Wark, Keller and Phelps (1961,p.28)⁽¹⁵⁾ report "the computed average annual sediment discharge of the Potomac River at Point of Rocks, Maryland, was 160 tons per square mile." The Potomac River drainage area at this point is 9,651 square miles. The Point of Rocks recording station is about 88 miles downstream from the mouth of the Cacapon (Lost) River. About 58 miles upstream from the mouth of the Cacapon River the Cumberland, Maryland, station has an average sediment yield of 182 tons per square mile per year for the 5-year period 1966 through 1970.

The comparison of the Cumberland, Maryland, and Point of Rocks, Maryland, data indicated a reduction of about 12 percent of the sediment load on a square mile basis between the two

points that are 145 miles apart. This would indicate that perhaps not more than 5 percent loss of the sediment yield from the Lost River should be attributed to deposition in the Potomac River system for any one year. This would be equivalent to approximately 5 tons per square mile of drainage area.

- (2) Comment: Structural and nonstructural: The land treatment in the watershed should be discussed with the completed project and as it is at present. It appears that treatment will be the same with or without the project. The land treatment alternatives should be more fully discussed.

The structural and nonstructural measures used to bring the project to completion and their environmental effects should be discussed so that the full impact of the work may be appraised; e.g. dams, channelization, riprap of banks, etc.

Response: The following statement has been added under Land Treatment on page 4:

There are 393 farms or landownerships in the watershed; 337 are cooperating with the Potomac Valley Soil Conservation District. These cooperators during the past 20 years have applied conservation land treatment measures to cropland, grassland, and forest land at the rate of 850 acres per year. The land treatment plan calls for the acceleration of this rate to about 1,150 acres per year. This is in addition to the continuing fire and pest control programs on 86,300 acres of forest land in the watershed.

The structural and nonstructural measures have been explained on pages 4, 7, 43, and 44 of the Statement.

- (3) Comment: Public reactions: Available news articles and results of public meetings and hearings should be included in the final statement as appendices so that local sentiment can be judged.

Response: The above-mentioned information is included as Appendix E in the Statement.

- (4) Comment: Water quality: Data on the present water quality of the watershed should be presented in the final EIS, and what are the expected conditions of Lost River after the reception of the effluent from the stabilization lagoon?

Will Lost River, during its annual period of low flow, be able to receive and assimilate the residual waste loads that it will be forced to accept? How will the disinfection of the effluent from the lagoon be carried out? Will it be throughout the year or only during recreation periods? What controls are to be used for monitoring the level of disinfection?

Response: Present water quality of the watershed is presented on pages 25 and 26 of the Statement. Low flows in Lost River will be adequate to receive and assimilate the residual waste loads from the stabilization lagoon. The 7-day, 10-year low flow for Lost River at the receiving point is approximately 2 cubic feet per second. Anticipated peak flows from the lagoon will be about 0.05 cubic feet per second. Therefore, the 90 percent BOD reduction in the lagoon should be satisfactory, and the nutrients will have a beneficial effect on Lost River. However, the effluent from the lagoon will be disinfected by a chlorination unit to guard against pathogenic organisms entering the river. The monitoring of fecal coliforms will be made a part of operation and maintenance programs for the recreation area. This will be carried out on a regular basis during the recreation season and will be done just below the confluence of Cove Run with Lost River.

The above data has been added to pages 11, 15, and 16 of the EIS, and to pages 30 and 43 of the Work Plan.

- (5) Comment: Drinking and sanitary water requirements indicate that wells may not be economical because of reported low yields. Construction of a well field should be considered during the detailed geologic work of the construction phases.

Response: During the detailed geologic investigation, the development of ground water will be checked.

Comment: If the water in the retention pools is to show an increase in fertility, as stated in the report, what managerial methods will be used to cope with certain eutrophication and proliferation of obnoxious aquatic weeds?

Response: Although some increases in fertility of impounded waters is expected, eutrophication problems are not anticipated. Land use above the proposed impoundment is about 85 percent forest land, 12 percent pastureland, and 3 percent cropland.

The population density of the watershed is about 11 people per square mile with about one dwelling per 300 acres above the impoundment. Major changes in land use or intensive development that might lead to eutrophication problems are not anticipated above the impoundment.

Of the 124 flood retarding impoundments completed in the State, no eutrophication problems have been encountered. Aquatic weed growth occurs along shorelines and in shallow coves, but it is not extensive and, in most cases, it is desirable for fish habitat. Lake edges are deepened to a minimum of 3 feet to limit excessive weed growth. If eutrophication or aquatic weed growth problems occur, appropriate measures to manage these problems will be taken by the Sponsors in consultation with the WV Department of Natural Resources. Changes have been made in the Operation and Maintenance section on pages 15 and 16 of the EIS and on page 43 of the Work Plan. Periodic drawdown for oxidation of organic deposits and for management of aquatic vegetation and fish populations might be practiced.

- (7) **Comment:** The public accessibility to the single-purpose facilities, if they are truly for public use, should be discussed in the final EIS. Statements in the report are contradictory in that it mentions the one recreation pool as the only facility with access roads.

Response: The decision of the local sponsors was to not provide public access because of the following reasons: (1) increased land rights costs; (2) cost of minimum basic facilities; (3) increased operation and maintenance costs; (4) potential for increased liability; (5) increased delays in project installation. Sponsors will take necessary steps to exclude the public to prevent development of unsanitary conditions and pollution.

The contradictory statements contained in paragraph 4 on page 45 and the fifth paragraph on page 48 of the Statement, have been rewritten for clarification.

- (8) **Comment:** In the final impact statement, delete redundancy in terms covering "Favorable Environmental Impacts."

Response: Combined statements B and L.

Advisory Council on Historic Preservation

- (1) Comment: Pursuant to its responsibilities under Section 102(2) (C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that your draft Environmental Statement appears procedurally adequate, however, we have the following substantive comments to make:

"In the future, in order to insure a comprehensive review of historical, cultural, archeological, and architectural resources, the Advisory Council suggests that draft Environmental Statements contain a copy of the comments of the West Virginia State Historic Preservation Officer concerning the effects of the undertaking upon these resources."

Response: Concur. We agree with your recommendation.

State of West Virginia as Represented by
Soil Conservation Committee

- (1) Comment: The State Soil Conservation Committee has followed very carefully the progress of the Lost River Watershed from the preliminary application to the completed Work Plan. Progress on this project has been reported regularly to the State Soil Conservation Committee, and they have been represented at all public hearings.

In view of the above, it is the recommendation of the State Soil Conservation Committee that the Work Plan be accepted by your office, and that necessary steps be taken to get this project under way. It has our full approval.

Response: None.

West Virginia Department of Natural Resources

- (1) Comment: Page 3, paragraph 1 - Before implementation, the benefits versus the fish and wildlife habitat loss for 11 miles of stream channel clearance, and 5 miles of streambank stabilization, should be carefully analyzed by the United States Forest Service.

Response: Stream Channel Clearance - This measure involves the removal of selected unstable debris only. For instance, old buried logs will not be disturbed. There will be no disturbance by mechanized equipment. The amount of funds requested for the 11 miles is \$1,500, since the anticipated amount of work is very small.

Stream Bank Stabilization - This measure involves the stabilization of selected unstable streambank areas. These areas will be stabilized by using logs and rocks, and planting trees and grasses in combination or singly according to the size and severity of the area involved. The amount of funds requested for the 5 miles is \$1,400.

All treatment measures, by design, will improve water quality and the usefulness of the water and related land resources

- (2) Comment: Page 7, paragraph 3 - Domestic waste facilities proposed for the recreational development at site No. 16 should be ample to accommodate present as well as projected needs.

Response: None.

- (3) Comment: Page 11, paragraph 4 - It is stated that "frequent flooding and sediment damage to agricultural lands and improvements is the primary problem in the watershed." Recognizing that the watershed is 74 percent forested, has unstable soils, only adequate annual precipitation, and a variety of socio-economic problems, it would appear that considerable study and research was the basis for your determination of sedimentation being the primary problem in the area. There is the potential for additional environmental impact, such as related developments, prompted by project implementation. It would follow that comprehensive planning should be initiated for the area, if not already in progress, to fully analyze the environmental effects of additional development.

Response: The land treatment program as presented on pages 4, 5, and 6 of the EIS is geared to future needs and problems that will occur as a result of increased activity in the watershed.

- (4) Comment: Page 14, paragraph 7 - In general, the evaluation of this statement indicates positive benefits to stream characteristics rather than adverse. It is important that the scenic river potential of the Cacapon and Lost Rivers is recognized. However, significant development on the watershed may substantially alter those stream values that provide the basis for this potential.

Response: We recognize the importance of the wild and scenic value of the Cacapon and Lost Rivers. The structures will be located on tributaries, rather than on the main stem, and will have little or no effect on the wild and scenic values of Lost River.

- (5) Comment: Page 18, paragraph 4 - No fishing on Cullers Run because of its intermittent nature.

Response: Concur. Changed on page 28 of Environmental Impact Statement.

- (6) Comment: Page 29, paragraph 2, 3, & 4 - An increase in pleasure boating may be in conflict with the commercial fisheries of the Potomac Estuary.

The reduction in sediment load caused by implementation of the watershed project will probably have little effect on increasing boating in the estuary until the algae blooms, foul odors, sewage, floating debris, and other problems are corrected, although curtailing the estuary's turbid water conditions would be a progressive step.

Response: Concur.

- (7) Comment: Page 33, paragraph 2 - Temperature stratification, at least of short duration, with the development of thermoclines will occur.

There are more nutrients near the bottom of a body of water. The benthic zone of ponds and lakes is rich in biological activity in the form of detritus feeders and decomposer organisms.

Response: Concur. Changes have been made on page 45..

(8) Comment: Page 34, paragraph 5 - A better explanation of how controlling floodwaters from 35 percent of the watershed can cause an 88 percent reduction in flood damage is needed. Does the 88 percent figure include flood reduction due to land treatment measures; or does it reflect strategic placement of structures; or is the reduction caused by a combination of factors?

Response: Numerous structures and various combinations of these structures were analyzed to determine the most effective and least costly combination that would meet the project objectives. Placement of the structures on major tributaries as close to the damage areas as possible resulted in a greater reduction of peaks, and damage then would normally be expected. The final alternate also included land treatment.

Discussions and Disposition of Each Problem, Objective, or Issue Raised on the Draft Work Plan by Federal, State, Local Agencies, and Others.

U.S. Department of the Interior

- (1) Comment: Our review of the project Work Plan leads us to question the assessment of project benefits. Inasmuch as the project benefit-cost ratio is a marginal 1.0 to 1, such questions become extremely pertinent.

Response: The updated benefit-cost ratio is 1.5 to 1. This is the result of a change in interest rates from 6-7/8 to 5-5/8 percent, current normalizing of the price base, and reevaluation of recreation benefits at \$2.25 per user-day. These changes are in accordance with the "Water Resources Development Act of 1974," (PL 93-251), and the Water Resources Council Principles and Standards. We are aware that discount rates fluctuate and that future rates are likely to be higher. However, at 6-7/8 percent, the benefit-cost ratio would be 1.2 to 1.

- (2) Comment: Development of the flood plain for uses inconsistent with its natural limitations is contrary to the Presidential Executive Order dated August 10, 1966. The project will offer protection from the 5-year flood to 476 acres which are now periodically inundated. More intensive utilization is expected and is being encouraged to follow. Such development can result in additional damages and thus require additional projects when floods of greater magnitude occur.

Response: Natural limitations of the flood plain include low-lying land and stream channel capacity that is inadequate for abnormal peak flows. Out-of-bank flooding occurs on 1,990 acres.

Field interviews revealed that agricultural use and some structural development on the flood plain is now, and has for many years, been inconsistent with natural limitations. The damage enumerator interviewed 38 owners of flood plain property in November 1970. An 87-year-old resident remembered first-floor flooding of her colonial home when she was a child. Questionnaires, which reflect responses of persons interviewed, are on record. Presence of colonial-type homes suggests intrusion on the flood plain since the time of President George Washington. The presidential policy of August 10, 1966 was obeyed to the extent that the executive order could be made compatible with Public Law 534.

Future utilization of the flood plain for purposes other than present use was not evaluated as a floodwater damage reduction benefit. The response to Comment No. 7 provides further explanation.

The sixth paragraph on page 36 of the Work Plan has been rewritten to clarify the above information.

- (3) Comment: Flood damages to homes and businesses do occur within the watershed due to encroachment on the flood plain; however, they are not severe and could be eliminated by floodproofing those buildings affected at a cost of \$10,000 per building provided the buildings were worth that amount. Total cost would be about \$200,000. This compares very favorably with the cost of the planned watershed Work Plan structures which is \$7,079,800.

Response: Refer to the response to Comment No. 13 of the U.S. Department of the Interior and to the Land Treatment, Floodproofing, and Flood Insurance section on page 17 that has been rewritten.

- (4) Comment: We note that public access to the single-purpose impoundment will not be provided due to the lack of safety and sanitary facilities. It is recommended that this decision be reexamined with a view towards having the facility yield maximum public benefits rather than the apparent partial ones only.

Response: The decision of the local sponsors was to not provide public access because of the following reasons: (1) increased land rights costs; (2) cost of minimum basic facilities; (3) increased operation and maintenance cost; (4) potential for increased liability; and (5) increased delays in project installation.

- (5) Comment: We also question the claimed sedimentation reduction benefits. While we agree that the needed land treatment measures will substantially reduce downstream sedimentation and that the impoundments will trap some of the sediment that does enter the waterway, we believe that the increased development in more intensive agricultural use planned for the flood plain area below the impoundment will negate any beneficial effects that might have otherwise been realized.

Response: Refer to the response to Comment No. 10 on the EIS of the U.S. Department of Interior.

- (6) Comment: We also question the assumed damage figure due to sedimentation. The \$6.53 per pound figure is very arbitrary. It places a higher damage value of the sedimentation on esthetics than on any other parameter. The methods of quantifying effects on esthetics should be explicitly outlined. We suggest a more realistic figure for the sediment damage would be the cost of its removal (less than \$2.00 per pound).

Response: The cost of \$6.53 a pound was not used, \$3.00 per ton is the figure that was used as stated on page 44 of the Work Plan. The figure used was adjusted by the OBERS factor to reflect the increased cost for doing business over the life of the project. This figure is compatible with the Dow Chemical values as also pointed out on page 57 of the Work Plan.

- (7) Comment: Another benefit that has not been explained adequately is the \$17,500 annually of non-agricultural changed land use benefits. If these can not be substantiated, their deletion would be appropriate. Flood damages (and, therefore, benefits) were "adjusted" to include future conditions in high hazard values. We question this rationale. Instead of planning for increased intrusion into the flood plain with its potential for subsequent increased damage, development in the flood plain, which is inconsistent with temporary flooding, should be restricted. Additionally, we question the benefits attributed to "restoration to former productivity." It has not been shown that the flood plain was ever flood free. The question then is whether productivity has really been reduced or is it merely limited as it has been in the past? This should be indicated.

Response: The \$17,500 average annual benefit to nonagricultural changed land use is an income enhancement type of benefit. The project will enable some land owners or part-time farmers to supplement their income by utilizing certain unique commercial recreation areas.

One example of such an area is in the vicinity of proposed Structure No. 4. Land on the Kimsey Run subreach, subject to flooding under present conditions, will be flood-free with the project because of its proximity to the structure. The owner is currently planning a recreational enterprise on land that is now in pasture.

Another example is just off U. S. Highway 259 near the sink holes of Lost River. A stratified shelf of land which has experienced flood damages and which is now in pasture, will be flood-free with the project. The part-time farmer, who now operates a motel in Wardensville, WV, plans to put in another motel where he now raises sheep.

Please note that two unique areas are involved in the examples cited. One is the area immediately below a structure where the degree of protection is extremely high, and the other is a stratified shelf where flooding will be eliminated. There are other unique areas.

It was estimated that nonagricultural changed land use would take place on 60 acres. Double counting was avoided by deleting 60 acres from land now used for pasture.

Senate Document No. 97 states: "The basic objective in formulation of plans is to provide the best use or combination of uses of water and related land resources to meet all foreseeable short and long-term needs."

The term "high hazard" values appearing in the comment may be alluding to the term "higher damageable values" that appear in the Work Plan. Projection for higher damageable values by using the U.S. Department of Commerce factors is valid. These projections indicate that incomes will increase. With the increase in incomes, the value of furnishings, homes, etc. will increase proportionately.

Instead of planning for increased intrusion into the flood plain, development inconsistent with temporary flooding will be discouraged by the Sponsors. This is explained on page 44 of the Work Plan and page 16 of the Statement.

The 476 acres of flood plain lands, which were once in crops or pasture, are now abandoned or in low-income producing use because of flooding. Reduced income from this condition was considered as a type of flood damage as revealed through field interviews. There has been an ongoing cycle of damage and partial recovery with a general trend toward deterioration. This has influenced resource budgeting and cropping patterns.

- (8) **Comment:** Consultation and review with appropriate agencies and others: The statement indicates that no known sites are located in the watershed area (page 22). However, there may be X number of unknown sites. The cultural environment should be assessed, i.e., and archeological survey performed to locate sites. If any should be found, they should be discussed in terms of adverse impact, mitigation, irreversible or irretrievable commitment. The statement that no known archeological sites are located in the watershed, is insufficient to determine whether any such sites might be affected by the project.

Response: Concur. The following statement has been added on page 30 of the Work Plan. Additional information concerning this subject has been added on pages 5 and 63 of the Work Plan and on pages 9, 47, and 61 of the Environmental Impact Statement.

The Watershed Work Plan has been coordinated with the West Virginia Antiquities Commission and the West Virginia Geological and Economic Survey. Investigations indicate that installation of the project will not encroach on any known archeological values or any historic site. If artifacts or other items of archeological or historical significance are uncovered before and during construction, construction will not begin or continue until the Director, West Virginia Department of Archives and History, and the National Park Service are notified and a course of action agreed to between the Sponsors, the Service, and responsible agencies is implemented. Should detailed investigation, salvage, or mitigation be necessary, appropriate arrangements will be made between the Sponsors, Soil Conservation Service, and the U.S. Department of the Interior, National Park Service. Provisions of the Reservoir Salvage Act will be followed.

U. S. Department of the Army - Corps of Engineers

- (1) Comment: In the first sentence, fifth paragraph, page 21, the word "acres" should be "acre-feet."

Response: Concur.

- (2) Comment: On page 28, third paragraph, it is stated that present population and growth trends indicate a need for recreational facilities in the area. However, no population data is provided to support this. In addition, on page 6, first paragraph, it is stated that the population of the watershed declined 4.9 percent from 1960 to 1970.

Response: A large majority of the recreation users will come from the eastern metropolitan areas which are within a 2 or 3 hour drive of the watershed. Population data to support the planned recreational development is presented on page 14, paragraph 5 of the Work Plan. For more information, refer to the response to Comment (1a) on the EIS by U.S. Environmental Protection Agency.

- (3) Comment: The local secondary benefits discussed on page 29 are not explained in sufficient detail to evaluate the rationale behind them. The correlation between these benefits and restoration of crop and pastureland benefits should be discussed.

Response: Local secondary benefits were assumed equal to 10 percent of direct primary benefits as provided for in the Soil Conservation Service Economics Guide. Local secondary benefits stemming from and induced by the project are estimated to average \$35,200. This is the result of locally stimulated marketing activities.

- (4) Comment: Costs of dams, particularly the larger ones, seem to be very low. However, there is insufficient cost data to make a complete cost evaluation.

Response: The Soil Conservation Service has supervised the design and construction of 124 similar structures installed in West Virginia during the past 20 years. The cost estimates shown for each structure were based on actual contract unit prices for similar dams and updated to current price levels.

- (5) Comment: We are not convinced that the 2,000 acres of flood plain land in agricultural use would be benefited to the extent claimed. Five-year protection to the 476 acres, however, will probably increase farm income.

Response: Benefits to crop and pastureland are not limited to the 2,000 acres "on site" flood plain. Benefits to crop and pasture in the contiguous Upper Cacapon Watershed were included.

- (6) Comment: Sediment yield reduction from a drainage area of 183 square miles (1.6 percent of watershed at Washington, D.C.) can hardly be considered to have a significant impact on the Potomac Estuary. Sediment carrying capacity of a stream is a function of velocity. Local velocity determines what the river will carry. Some sediment yield is to be expected along all stretches of a river.

Response: The 183 square mile watershed is a significantly large area, and if soil and water conservation measures are installed on enough such areas, they will have a meaningful impact on the entire Basin including the estuary. This was one of the reasons for the enactment of Public Law 534 by the U.S. Congress.

Velocity is only one of the factors affecting the sediment load carried by a stream. Other significant factors are vegetative cover, land use, soils, geology, rainfall, storm frequency, turbulence, and discharge.

For further information, refer to the response to Comment (1c) on the EIS by the U.S. Environmental Protection Agency.

- (7) Comment: The annual downstream sediment reduction benefits of \$79,900 appear to be liberally stated when the ratio of the drainage area controlled by the project to the drainage area of the Potomac River at Washington, D.C., is considered.

Response: Refer to the response to Comment (6) on the Work Plan by the U.S. Department of the Interior.

LIST OF APPENDICES

Appendix A - Structure Data

Appendix B - Comparison of Benefits and Costs for Structural Measures

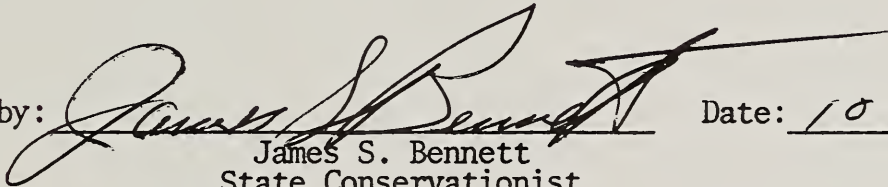
Appendix C - Letters of Comment Received

Appendix D - Bibliography of Reference Sources

Appendix E - Public Meetings

Appendix F - Project Map

Approved by:


James S. Bennett
State Conservationist

Date: 10-21-74

APPENDIX A

Structure Data

APPENDIX A

STRUCTURE DATA
FLOODWATER RETARDING STRUCTURES

Lost River Subwatershed, West Virginia

Item	Unit	STRUCTURE NO.					Total
		4	10	16	23	27	
Class of Structure		c	c	c	c	c	XXX
Drainage Area	Sq. Mi.	32.6	6.69	11.79	9.95	3.72	64.75
Curve No. (1-day) (AMC II)		72	71	72	71	70	XXX
T _c	Hrs.	4.67	1.40	1.58	2.30	1.48	XXX
Elevation Top of Dam	Ft.	1482.2	1619.2	1583.0	1849.1	1956.4	XXX
Elevation Crest of ESW	Ft.	1469.3	1608.4	1571.0	1834.7	1945.8	XXX
Elevation Crest of Riser	Ft.	1438.4	1586.0	1541.2	1807.2	1922.8	XXX
Maximum Height of Dam	Ft.	100.0	78.0	86.0	92.0	73.0	XXX
Volume of Fill	Cu. Yds.	1,020,150	330,550	1,244,050	475,760	307,030	3,377,540
Total Capacity	Ac. Ft.	7625	1652	3769	2460	813	16,319
Sediment Submerged 100 Years	Ac. Ft.	605	202	198	312	60	1,377
Sediment Aerated	Ac. Ft.	48	16	16	25	5	110
Recreation	Ac. Ft.	--	--	502	--	--	502
Between High and Low Stages	Ac. Ft.	1739	357	629	531	198	3,454
Retarding	Ac. Ft.	6972	1434	3053 ^{3/}	2123	748	14,330
Surface Area							
Sediment Pool ^{1/}	Acres	70.0	18.5	25.0	22.8	6.5	142.8
Recreation Pool	Acres	--	--	50.0	--	--	50.0
Retarding Pool ^{2/}	Acres	214.0	65.5	95.0	75.0	35.5	485.0
Principal Spillway							
Rainfall Volume (areal) (1-day)	Inches	6.48	6.75	6.75	6.75	6.75	XXX
Rainfall Volume (areal) (10-day)	Inches	11.00	11.30	11.30	11.30	11.30	XXX
Runoff Volume (10-day)	Inches	6.28	6.55	6.55	6.55	6.26	XXX
Capacity High Stage (Max.)	cfs.	894	321	459	445	210	XXX
Capacity Low Stage (Max.)	cfs.	500	102	162	154	51	XXX
Frequency of Operation - ESW	% chance	1	1	1	1	1	XXX
Size of Conduit	Dia. In.	Twin 48	42	48	48	36	XXX
Emergency Spillway							
Rainfall Volume (ESH) (areal)	Inches	9.8	10.9	10.7	10.9	10.9	XXX
Runoff Volume (ESH)	Inches	6.31	7.18	7.13	7.18	7.04	XXX
Type		Rock	Earth	Earth	Rock	Earth	XXX
Bottom Width	Feet	500	300	400	200	160	XXX
Velocity of Flow (V _e)	fps.	9.42	8.65	8.80	10.70	8.70	XXX
Slope of Exit Channel	Ft./Ft.	0.02	0.02	0.02	0.02	0.02	XXX
Max. Water Surface Elevation	Feet	1472.9	1611.8	1574.5	1841.5	1949.2	XXX
Freeboard							
Rainfall Volume (FH) (areal)	Inches	24.15	26.80	26.26	26.80	26.80	XXX
Runoff Volume (FH)	Inches	20.08	22.45	22.14	22.45	22.26	XXX
Maximum Water Surface Elevation	Feet	1482.2	1619.2	1583.0	1849.1	1956.4	XXX
Capacity Equivalents (Total)	Inches	4.39	4.63	5.38	4.64	4.14	XXX
Sediment Volume	Inches	0.33	0.61	0.34	0.64	0.37	XXX
Retarding Volume	Inches	4.01	4.02	4.22	4.00	3.77	XXX
Recreation Volume	Inches	--	--	0.82	--	--	XXX

^{1/} Based on storing 100-year submerged sediment accumulation.

^{2/} Surface area at emergency spillway crest.

^{3/} Includes 397 acre-feet of design storage.

July 1974

APPENDIX B

Comparison of Benefits and Costs for Structural Measures

APPENDIX B

COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Lost River Watershed, West Virginia

(Dollars) 1/

Evaluation Unit	AVERAGE ANNUAL BENEFITS		AVERAGE ANNUAL BENEFITS		AVERAGE ANNUAL BENEFITS		AVERAGE ANNUAL BENEFITS		AVERAGE ANNUAL BENEFITS		AVERAGE ANNUAL BENEFITS	
	: Damage		: Changed Land:		: Use		: Recreation		: Secondary:		: development:	
	: Reduction		: 2/:		: Non-Agricul.:		: Recreation		: Secondary:		: development:	
	: Unit		: Reduction		: 2/:		: Non-Agricul.:		: Recreation		: Secondary:	
All Structural Measures	221,600	17,500	158,700	35,200	93,800	526,800	379,400	1.4:1				
Project Administration	--	--	--	--	--	--	44,100	--				
GRAND TOTAL	221,600	17,500	158,700	35,200	93,800	526,800	423,500	1.2:1	4/			

1/ Price Base 1973 for costs; adjusted current normalized for benefits.

2/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of \$14,600 annually.

3/ From Table 4.

4/ Based upon 5-1/2 percent discount rate. The benefit cost ratio is 1.5:1.0 based on a discount rate of 5-5/8 percent, using current normalized prices and current recreation benefits.

APPENDIX C

Letters of Comment Received



DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MARYLAND 21203

NABPL-E

11 February 1974

Mr. James S. Bennett
State Conservationist
United States Department of
Agriculture
Soil Conservation Service
P.O. Box 865
Morgantown, West Virginia 26505

Dear Mr. Bennett:

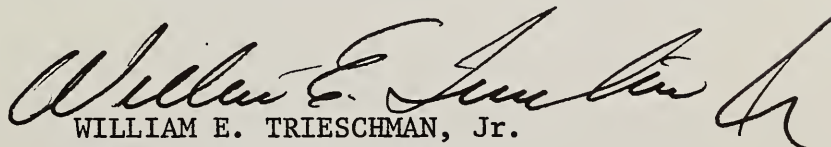
This letter is in response to your request for our review and comments on the Draft Environmental Impact Statement and Work Plan for Watershed Protection and Flood Prevention, Lost River Subwatershed located in Hardy County, West Virginia. We are forwarding our comments as an inclosure.

Both documents appear to be quite informative and well detailed. It is suggested, however, that some sections should be reorganized to reduce the number of one sentence paragraphs and similar isolated statements. This would improve the readability of the documents and enhance the comprehension by the reader. Further suggestions and comments are covered in the inclosed comment sheet.

Please be advised that copies of this response have been forwarded to the Council on Environmental Quality.

Thank you for allowing us this review. If we can be of further assistance, do not hesitate to contact this office.

Sincerely yours,


WILLIAM E. TRIESCHMAN, Jr.
Chief, Planning Division

1 Incl
As stated

COMMENTS ON WORK PLAN
LOST RIVER SUBWATERSHED,
OF THE POTOMAC RIVER WATERSHED
HARDY COUNTY, WEST

1. In the first sentence, fifth paragraph, page 21, the word "acres" should be "acre-feet."
2. On page 28, third paragraph, it is stated that present population and growth trends indicate a need for recreational facilities in the area. However, no population data is provided to support this. In addition, on page 6, first paragraph, it is stated that the population of the watershed declined 4.9 percent from 1960 to 1970.
3. The local secondary benefits discussed on page 29 are not explained in sufficient detail to evaluate the rationale behind them. The correlation between these benefits and restoration of crop and pastureland benefits should be discussed.
4. Costs of dams, particularly the larger ones, seem to be very low. However, there is insufficient cost data to make a complete cost evaluation.
5. We are not convinced that the 2000 acres of flood plain land in agricultural use would be benefited to the extent claimed. Five year protection to the 476 acres, however, will probably increase farm income.
6. Sediment yield reduction from a drainage area of 183 square miles (1.6 percent of watershed at Washington, D. C.) can hardly be considered to have a significant impact on the Potomac Estuary. Sediment carrying capacity of a stream is a function of velocity. Local velocity determines what the river will carry. Some sediment yield is to be expected along all stretches of a river.
7. The annual downstream sediment reduction benefits of \$79,900 appear to be liberally stated when the ratio of the drainage area controlled by the project to the drainage area of the Potomac River at Washington, D. C., is considered.

COMMENTS ON USDA PRELIMINARY DRAFT
ENVIRONMENTAL STATEMENT
LOST RIVER SUBWATERSHED OF THE
POTOMAC RIVER WATERSHED
HARDY COUNTY, WEST VIRGINIA

1. Is the operational and maintenance cost of \$2,100 annually for Structures No. 4, 10, 23, and 27 correct? This figure seems grossly out of line with the scope of work listed on page 8, paragraph 3, EIS. Compare with figure of \$30,200 annual operation and maintenance cost of multi-purpose structure at Site No. 16.
2. What is the percentage of Class V soils as is described on page 13, paragraph 4? Are they incorporated into another category in the chart on page 12 or are they nonexistent in the project.
3. Page 30, paragraph 1, should read "nine million people" instead of "one million".
4. What will the long term (10 year +) effects of aquatic eutrophication be on suggested farm ponds due to resulting higher water temperature and still water? Are these closed water bodies or will they be nodes along a moving water system?
5. No mention is made in the EIS text of relative pool elevations and then visual impacts at levels of maximum flood, mean flood, conservations, and recreation stages.
6. The report is rather weak in its discussion of visual amenities and opportunities. The project area appears to be rich in scenic value and warrants more consideration, i.e. how will scenic qualities be enhanced, and if so, how will they be enjoyed.



OFFICE OF THE ASSISTANT SECRETARY OF COMMERCE
Washington, D.C. 20230

February 13, 1974

Mr. James S. Bennett
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
P. O. Box 865
Morgantown, West Virginia 26505

Dear Mr. Bennett:

The draft environmental impact statement for the proposed "Lost River Subwatershed of the Potomac River Watershed Hardy County, West Virginia," which accompanied your letter of December 20, 1973, has been received by the Department of Commerce for review and comment.

The statement has been reviewed and the following comments are offered for your consideration.

ENVIRONMENTAL SETTING

Fish and Wildlife Resources

Pages 17-19. We note that major wildlife species, a variety of finfish species, and several aquatic insects are listed in this section. However, no mention is made of other organisms that may be found in Lost River River Watershed, such as reptiles, amphibians, and invertebrate species other than the aquatic insects mentioned. The list of species inhabiting this area should be expanded to include these other organisms, giving attention to the presence of rare or endangered species. A list of threatened fishes, reptiles, amphibians, birds, and mammals is included in Threatened Wildlife of the United States (1973 Edition), and rare and endangered mollusks are included in Proceedings of a Symposium on Rare and Endangered Mollusks (Naiads) of the U.S. (1971), both published by the Fish and Wildlife Service, U. S. Department of the Interior.

Page 19. The table at the top of the page contains several errors: the "northern sulpin," incorrectly listed under Cyprinidae, should be listed under Cottidae; the "creek chub," incorrectly listed under Catostomidae, should be listed under Cyprinidae. Furthermore, the "glassjaw minnow" is not listed in the American Fisheries Society Special Publication No. 6, A List of Common and Scientific Names of Fishes from the United States and Canada (third edition) (1970). This species should be correctly identified in the final environmental impact statement.

SHORT-TERM vs. LONG-TERM USE OF RESOURCES

Page 43. It is stated that the economic life of the project will be 100 years, at the end of which time the structures may be removed. If these structures are removed, the sudden release of the impounded sediments would have an adverse environmental impact; such a possibility and its effects should be discussed.

Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you. We would appreciate receiving a copy of the final statement.

Sincerely,

A handwritten signature in cursive script that reads "Sidney R. Galler".

Sidney R. Galler
Deputy Assistant Secretary
for Environmental Affairs



United States Department of the Interior

OFFICE OF THE SECRETARY

NORTHEAST REGION

JOHN F. KENNEDY FEDERAL BUILDING

ROOM 2003 J & K

BOSTON, MASSACHUSETTS 02203

ER-74/2

March 1, 1974

Mr. James S. Bennett, State Conservationist
U. S. Department of Agriculture
Soil Conservation Service
P. O. Box 865
Morgantown, West Virginia 26505

Dear Sir:

This constitutes our review of your draft environmental statement and Watershed Work Plan for the Lost River Watershed Project, Harding County, West Virginia. Our comments are provided in response to your December 19, 1973 letter to Assistant Secretary Larson.

ENVIRONMENTAL STATEMENT

We find this statement to be incomplete in its discussion of project effects and alternatives. The effect of the project on fish and wildlife resources has not been fully explored, nor is the discussion on sedimentation complete. All alternatives have not been considered and those that were discussed were dismissed without full consideration for their environmental advantages. Our more specific comments are given below on a section by section basis.

STRUCTURAL MEASURES

This section should be expanded to indicate the volume of flow expected from each impoundment under the various conditions expected.

Page 7, paragraph 6. The 735 acres required for structures and facilities should be broken down into land use types as they presently exist.

ENVIRONMENTAL SETTING

Page 12. In discussing Land Capacity Classes I and II, it is stated that the soils may be used safely; however, these soils are in the flood plain



Let's Clean Up America For Our 200th Birthday

Development of the flood plain for uses inconsistent with its natural limitations is contrary to the Presidential Executive Order dated August 10, 1966. The project will offer protection from the five year flood to 476 acres which are now periodically inundated. More intensive utilization is expected and is being encouraged to follow. Such development can result in additional damages and thus require additional projects when floods of greater magnitude occur.

Flood damages to homes and businesses do occur within the watershed due to encroachment on the flood plain; however, they are not severe and could be eliminated by flood proofing those buildings affected at a cost of 10,000 dollars per building, provided the buildings were worth that amount. Total cost would be about 200,000 dollars. This compares very favorably with the cost of the planned watershed work plan structures which is 7,079,800 dollars.

We note that public access to the single purpose impoundment will not be provided due to the lack of safety and sanitary facilities. It is recommended that this decision be re-examined with a view towards having the facility yield maximum public benefits rather than the apparent partial ones only.

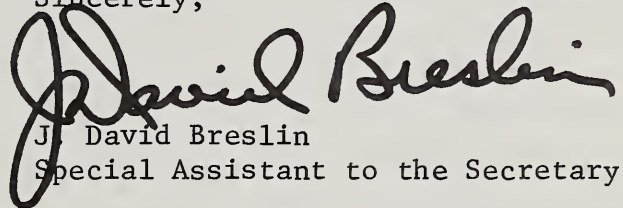
We also question the claimed sedimentation reduction benefits. While we agree that the needed land treatment measures will substantially reduce downstream sedimentation and that the impoundments will trap some of the sediment that does enter the waterway, we believe that the increased development in more intensive agricultural use planned for the flood plain area below the impoundment will negate any beneficial effects that might have otherwise been realized. We also question the assumed damage figure due to sedimentation. The \$6.53 per pound figure is very arbitrary. It places a higher damage value of the sedimentation on esthetics than on any other parameter. The methods of quantifying effects on esthetics should be explicitly outlined. We suggest a more realistic figure for the sediment damage would be the cost of its removal (less than \$2.00 dollars per pound.)

Another benefit that has not been explained adequately is the \$17,500 annually of non-agricultural changed land use benefits. If these can not be substantiated, their deletion would be appropriate. Flood damages (and, therefore, benefits) were "adjusted" to include future conditions in high hazard values. We question this rationale. Instead of planning for increased intrusion into the flood plain with its potential for subsequent increased damage, development in the floodplain which is inconsistent with temporary flooding should be restricted. Additionally, we question the benefits attributed to "restoration to former productivity." It has not been shown that the floodplain was ever flood free. The question then is whether productivity has really been reduced or is it merely limited as it has been in the past? This should be indicated.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

The statement indicates that no known sites are located in the watershed area (page 22). However, there may be X number of unknown sites. The cultural environment should be assessed, i.e., and archeological survey performed to locate sites. If any should be found, they should be discussed in terms of adverse impact, mitigation, irreversible or irretrievable commitment. The statement that no known archeological sites are located in the watershed, is insufficient to determine whether any such sites might be affected by the project.

Sincerely,

A handwritten signature in dark ink, appearing to read "J. David Breslin". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent. The ink is dark and the background is white.

J. David Breslin
Special Assistant to the Secretary



DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/73)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: (202) 426-2262

11 FEB 1974

Mr. James S. Bennett
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 865
Morgantown, W. Va. 26505

Dear Mr. Bennett:

This is in response to your letter of 19 December 1973 addressed to Admiral Bender concerning the draft environmental impact statement for the Lost River Watershed Project, Hardy County, West Virginia.

The Department of Transportation has reviewed the material submitted. We have no comments to offer nor do we have any objection to the project.

The opportunity to review this draft environmental impact statement is appreciated.

Sincerely,

R. J. FRIE
Captain, U.S. Coast Guard
Deputy Chief, Office of Planning
Environmental Systems
By direction of the Commandant



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

February 15, 1974

Mr. Norris R. Caryl
Acting State Conservationist
Soil Conservation Service
P.O. Box 865
Morgantown, West Virginia 26505

Dear Mr. Caryl:

We have reviewed the draft EIS on the Lost River Watershed, Hardy County, West Virginia and offer the enclosed comments.

The meeting that was held in this office with you and members of your staff clarified some issues but many will have to be addressed in the final impact statement. The vague issues and unanswered questions are set forth in the attached comments.

Because it was impossible to assess the environmental effects of this project, we must assign the EIS to EPA reporting category 3. This means that we consider the report to be inadequate. This classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed actions under Section 309 of the Clean Air Act.

Please feel free to call this office for any assistance we can offer in interpreting or implementing these comments.

Sincerely yours,

Nicholas M. Ruha
Chief,
EIS and Wetlands Review Section

Enclosure

Comments on Draft Environmental Impact Statement
for
Lost River Watershed of the Potomac River Watershed
Hardy County, West Virginia

1. Benefit cost ratio: The method of calculating the benefit cost ratio should be clarified in the final EIS. We believe the following in particular needs clarification:

- a. Is there a need for flood control and recreation in this area? The lack of population and/or industrial concentrations in the basin makes a justification of the project very tenuous. There are recreational areas presently located in the region. The project is far removed from metropolitan areas and with present restrictions on travel it is very questionable as to the number of visitors that would make use of the "day use" facility.
- b. The discussion of the benefits and costs of agricultural production on the flood plain is not clear, for example the yield and value of the corn the area could produce.
- c. The costs assigned to dredging in the Potomac Estuary assumes that the sediment load from an adjoining watershed will be identical to Lost River watershed, and that the entire load reaches the Potomac estuary, which is not valid. Statistics for sediment load should be from the Lost River drainage area.

2. Structural and non-structural: The land treatment in the watershed should be discussed with the completed project and as it is at present. It appears that treatment will be the same with or without the project. The land treatment alternatives should be more fully discussed.

The structural and non-structural measures used to bring the project to completion and their environmental effects should be discussed so that the full impact of the work may be appraised; e.g. dams, channelization, rip-rap of banks, etc.

3. Public reactions: If available news articles and results of public meetings and hearings should be included in the final statement as appendices so that local sentiment can be judged.

4. Water quality: Data on the present water quality of the watershed should be presented in the final EIS and what are the expected conditions of Lost River after the reception of the effluent from the stabilization lagoon? Will Lost River during its annual period of low flow be able to receive and assimilate the residual waste loads that it will be forced to accept?

How will the disinfection of the effluent from the lagoon be carried out? Will it be throughout the year or only during recreation periods? What controls are to be used for monitoring the level of disinfection?

Drinking and sanitary water requirements indicates that wells may not be economical because of reported low yields. Construction of a well field should be considered during the detailed geologic work of the construction phases.

If the water in the retention pools is to show an increase in fertility, as stated in the report, what managerial methods will be used to cope with certain eutrophication and the proliferation of obnoxious aquatic weeds?

5. The public accessibility to the single purpose facilities, if they are truly for public use, should be discussed in the final EIS. Statements in the report are contradictory in that it mentions the one recreation pool as the only facility with access loads.

6. In the final impact statement delete redundancy in items covering "Favorable Environmental Impacts".

**ADVISORY COUNCIL
ON
HISTORIC PRESERVATION**

WASHINGTON, D.C. 20240

January 4, 1974

Mr. James S. Bennett
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 865
Morgantown, West Virginia 26505

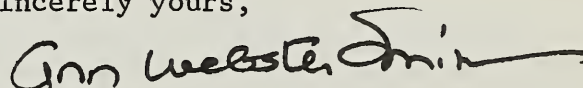
Dear Mr. Bennett:

This is in response to your request of December 20, 1973, for comments on the environmental statement for the proposed Lost River Watershed project, Hardy County, West Virginia. Pursuant to its responsibilities under Section 102(2)(C) of the National Environmental Policy Act of 1969, the Advisory Council on Historic Preservation has determined that your draft environmental statement appears procedurally adequate, however, we have the following substantive comments to make:

In the future, in order to insure a comprehensive review of historical, cultural, archeological, and architectural resources, the Advisory Council suggests that draft environmental statements contain a copy of the comments of the West Virginia State Historic Preservation Officer concerning the effects of the undertaking upon these resources. The State Historic Preservation Officer for West Virginia is Mr. Leonard Davis, State of West Virginia Antiquities Commission, Old Mountainlair, West Virginia University, Morgantown, West Virginia 26506.

Should you have any questions on these comments or require any additional assistance, please contact Jordan Tannenbaum (202-254-3974) of the Advisory Council staff.

Sincerely yours,



Ann Webster Smith
Director, Office of Compliance

MEMBERS

Gus R. Douglass, Chairman
Charleston

Robert S. Dunbar, Jr.
Morgantown

Ronald Stump
Morgantown

Ira S. Latimer, Jr.
Charleston

J. G. Brown
Charles Town

L. L. Lough
Morgantown

Daniel Hale
Princeton



State of West Virginia

Soil Conservation Committee
Charleston, West Virginia 25305

January 23, 1974

Carroll Greene
Executive Secretary
Kenna

Lawrence Idleman
Field Agent
Elk Garden

James S. Bennett
Advisory Member
Morgantown

Mr. James S. Bennett
State Conservationist
Soil Conservation Service
P. O. Box 865
Morgantown, West Virginia

Dear Mr. Bennett:

The State Soil Conservation Committee has followed very carefully the progress of the Lost River Watershed from the preliminary application to the completed work plan. Progress on this project has been reported regularly to the State Soil Conservation Committee, and they have been represented at all public hearings.

In view of the above, it is the recommendation of the State Soil Conservation Committee that the work plan be accepted by your office and that necessary steps be taken to get this project under way. It has our full approval.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Gus R. Douglass".

Gus R. Douglass
Chairman

GRD/bc



STATE OF WEST VIRGINIA
DEPARTMENT OF NATURAL RESOURCES
CHARLESTON 25305

IRA S. LATIMER, Jr.
Director

February 26, 1974

Mr. James S. Bennett
State Conservationist
United States Department
of Agriculture
Post Office Box 865
Morgantown, West Virginia 26505

RE: Lost River Subwatershed DEIS,
USDA-SCS-ES-FP-(ADM)-74-20-(D)

Dear Mr. Bennett:

The West Virginia Department of Natural Resources generally concurs with the environmental assessment of the Lost River Subwatershed Project. The following comments and recommendations are made in response to your Draft Environmental Impact Statement (DEIS).

An overall analysis indicates that environmental assessment of the project should provide more emphasis on cropland conservation procedures rather than the presentation of production measures.

Throughout the DEIS, the incongruity of figures was questionable. To clarify the statement, more detailed explanations are needed of the following derivations: acreage of waterfowl and fish habitat created; land-use change figures; percent reduction in flood plain damage with project implementation; percent reduction in annual sediment yield; etc.

Reference is made to the following specific items:

Page 3, paragraph 1--Before implementation, the benefits versus the fish and wildlife habitat loss for 11 miles of stream channel clearance and 5 miles of streambank stabilization should be carefully analyzed by the United States Forest Service.

Page 7, paragraph 3--Domestic waste facilities proposed for the recreational development at Site No. 16 should be ample to accommodate present as well as projected needs.

Page 11, paragraph 4--It is stated that "frequent flooding and sediment damage to agricultural lands and improvements is the primary problem in the watershed". Recognizing that the watershed is 74 percent forested, has unstable soils, only adequate annual precipitation, and a variety of socio-economic problems, it would appear that considerable study and research was the basis for your determination of sedimentation being the primary problem in the area. There is the potential for additional environmental impact, such as related developments, prompted by project implementation. It would follow that comprehensive planning should be initiated for the area, if not already in progress, to fully analyze the environmental effects of additional development.

Page 14, paragraph 7--In general, the evaluation of this statement indicates positive benefits to stream characteristics rather than adverse. It is important that the scenic river potential of the Cacapon and Lost Rivers is recognized. However, significant development on the watershed may substantially alter those stream values that provide the basis for this potential.

Page 18, paragraph 4--No fishing on Cullers Run because of its intermittent nature.

Page 29, paragraph 2, 3, & 4--An increase in pleasure boating may be in conflict with the commercial fisheries of the Potomac Estuary.

The reduction in sediment load caused by implementation of the watershed project will probably have little effect on increasing boating in the estuary until the algae blooms, foul odors, sewage, floating debris, and other problems are corrected, although curtailing the estuary's turbid water conditions would be a progressive step.

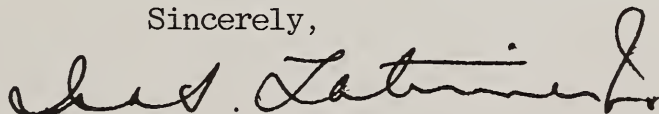
Page 33, paragraph 22--Temperature stratification, at least of short duration, with the development of thermoclines will occur.

There are more nutrients near the bottom of a body of water. The benthic zone of ponds and lakes is rich in biological activity in the form of detritus feeders and decomposer organisms.

Page 34, paragraph 5--A better explanation of how controlling floodwaters from 35 percent of the watershed can cause an 88 percent reduction in flood damage is needed. Does the 88 percent figure include flood reduction due to land treatment measures; or does it reflect strategic placement of structures; or is the reduction caused by a combination of factors?

If you have any questions, or if you desire additional information, contact H. G. Woodrum, Chief, Research and Statistics Section.

Sincerely,



Ira S. Latimer, Jr.
Director

APPENDIX D

Bibliography of Reference Sources

APPENDIX D

Bibliography of Reference Sources

- 1 National Handbook of Conservation Practices, USDA - Soil Conservation Service, July 1971.
- 2 United States Water Resource Regions and Subregions for the National Assessment of Water and Related Land Resources, Water Resource Council, July 1970.
- 3 OBERS Projections: Economic Activity in the United States, U.S. Dept. of Commerce, Social and Economic Statistics Administration, Bureau of Economic Analysis, Regional Economic Division, and U.S. Dept. of Agriculture, Economic Research Service, Natural Resource Division, September 1972.
- 4 National Inventory of Soil Conservation Service Needs for 1967, USDA Statistical Bulletin 461.
- 5 1972-1973 Big Game Bulletin, West Virginia Department of Natural Resources, Elkins, WV.
- 6 Natural Population Fluctuations of Lost River, West Virginia Conservation Commission, 1956. DJ. Project F-1-R-5.
- 7 Stream Survey of District II West Virginia, West Virginia Department of Natural Resources, 1969. DJ. Project F-10-R(1-11).
- 8 West Virginia 1969 Census of Agriculture, U.S. Dept. of Commerce, Social and Economic Statistics Administration, June 1972.
- 9 Outdoor Recreation Potential of Hardy County, USDA, Soil Conservation Service, Morgantown, WV, 1972.
- 10 A Brief History of Early Times in Lost River Community, 1925, B.F. Chrisman (unpublished manuscript).
- 11 Comprehensive Survey of the Potomac River Basin, U.S. Army Corps of Engineers, Baltimore, Md.
- 12 An Economic Analysis of Erosion and Sediment Control Methods for Watershed Undergoing Urbanization (C-1677), Dow Chemical Company, February 1972.
- 13 Statewide Comprehensive Outdoor Recreation Plan (SCORP), State of West Virginia, Bureau of Outdoor Recreation, 1971.
- 14 Inter-Agency Stream Disturbance Symposium Proceedings, West Virginia Department of Natural Resources, Charleston, WV, 1968.
- 15 Werk, Keller, & Phelps, 1961, Reconnaissance of Sedimentation and Chemical Quality of Surface Water in the Potomac River Basin, Potomac River Basin Report, Appendix H, Volume VII, Sedimentation Studies (Feb. 1963), U. S. Corps of Engineers, North Atlantic Division.

APPENDIX E

Public Meetings

APPENDIX E

PUBLIC MEETINGS

March 1969

Letter from James S. Bennett, State Conservationist to Kenneth E. Grant, Administrator, Soil Conservation Service told of public informational meeting that was held at the beginning of detailed planning. At that time no significant objections to the project were encountered.

June 3, 1971

There was conducted a public hearing in regard to the Lost River Watershed held at Mathias, West Virginia, on June 3, 1971 at 7:30 p.m.

Approximately 40 people were in attendance and the meeting was brought to order by Judge H. G. Muntzing, of Moorefield, West Virginia, who acted as Chairman for the meeting, and stated that the purpose of this meeting was to explain to the public the watershed protection and flood prevention project that has been formulated by the Lost River Watershed Association and the Potomac Valley Soil Conservation District with the assistance of the Soil Conservation Service.

Judge Muntzing further pointed out that this was a similar problem as that which had been recently completed on the South Fork of the Potomac River, where 24 locations have been made and 20 have been completed. Also similar to the project on Patterson Creek, Lunice Creek and New Creek.

Mr. Paul Dunn, a member of the Soil Conservation Service, explained the project to the group showing plans and plats of the 5 selected locations on Lost River. He stated that it would take about 6 months for plans to be completed and approximately a year thereafter for the work to start if the project is approved. He fully explained each location, the size and approximate cost of same. Mr. Dunn also explained what advantages there would be to the public and those involved in the area under discussion.

Individuals were called upon for their remarks and those who opposed same were a group of people near to Site 23 and Site 16. They were concerned mostly with their land being taken and apparently did not understand fully the plans in connection with these dams. After the meeting the same was fully explained to the individuals who seemed to understand the project better than when they had arrived at the meeting. There were those who believe the project would be of a great benefit to the community and that construction of the dams were necessary for the protection from flood waters in the Lost River area.

The question in regards to condemnation of land when necessary was discussed, and the procedure of same was explained by Judge Muntzing.

It was pointed out how successful dams were in the South Fork area, and the great protection that they are serving from floodwaters. It was suggested that those who are interested, visit some of the dam sites on South Fork in Hardy County so that they will become more appreciative of what these dams will do for the public and the land-owners.

It was pointed out by some that what we are doing now is very constructive for the benefit of the future generations by having these conservation dams constructed.

Plans of the proposed dams involving the Lost River area were handed out to the various individuals after the meeting, and they were individually discussed by Mr. Dunn and others after the meeting had adjourned.

Submitted by:

Donald W. Biller
Secretary

POTOMAC VALLEY
SOIL CONSERVATION DISTRICT

March 15, 1968

Dear Neighbor:

I have called a meeting of Lost River landowners. We will meet Friday evening, March 22nd, 7:00 p.m. at the Mathias High School Auditorium.

This meeting is to get a watershed project started on Lost River. To do this we need to form a committee of 25 or 30 landowners to assist in planning the project, to make decisions concerning the project and to keep the rest of the landowners informed.

Also, the USDA Soil Conservation Service will help us with our project. It is necessary that we request their assistance in writing. They in turn will furnish us planning assistance and the funds needed to construct any flood retarding dams.

Please come if at all possible and help us get started with this important project.

Sincerely,

Donald W. Biller

Donald W. Biller, Hardy County
Supervisor,
Potomac Valley Soil Conservation District
Lost River, West Virginia 26811

Telephone: 897-2633

Nominating Committee For L. River Watershed Named



NOMINATING COMMITTEE—(Standing) left to right: J. Winston Teets, Donald Biller, John Wood, John Ely. (Seated) Hoy Dove, Jr., chairman, Terry Sherman.

Moorefield Examiner, April 2, 1969

Investigations and Surveys Are Aired By Group

On March 20, the Steering Committee selected the following to serve on the nominating committee for the Lost River Watershed: J. Winston Teets, Donald Biller, John Wood, John Ely, Hoy Dove, Jr., [chairman], and Terry Sherman.

The Lost River Watershed Steering Committee met Thursday night, March 20, at Mathias High School, with representatives from the State U.S.D.A. Soil Conservation Service Watershed Planning Party to discuss and review the preliminary investigations and surveys of the Lost River Watershed which were requested by citizens living in the watershed drainage area.

Swecker Presents Information.

Information was presented to the group by Paul E. Swecker, District Conservationist for Hardy County. William Kennedy, State Watershed Planning Economist, Terry Fairbanks, State Watershed Planning Engineer. Also attending were Sull McCartney, District Conservationist for Grant County and Robert L. Baker and Donald Eiller, Supervisors of the Potomac Valley Soil Conservation District.

The meeting was presided over by J. Winston Teets, Chairman of the Lost River Watershed Steering Committee.

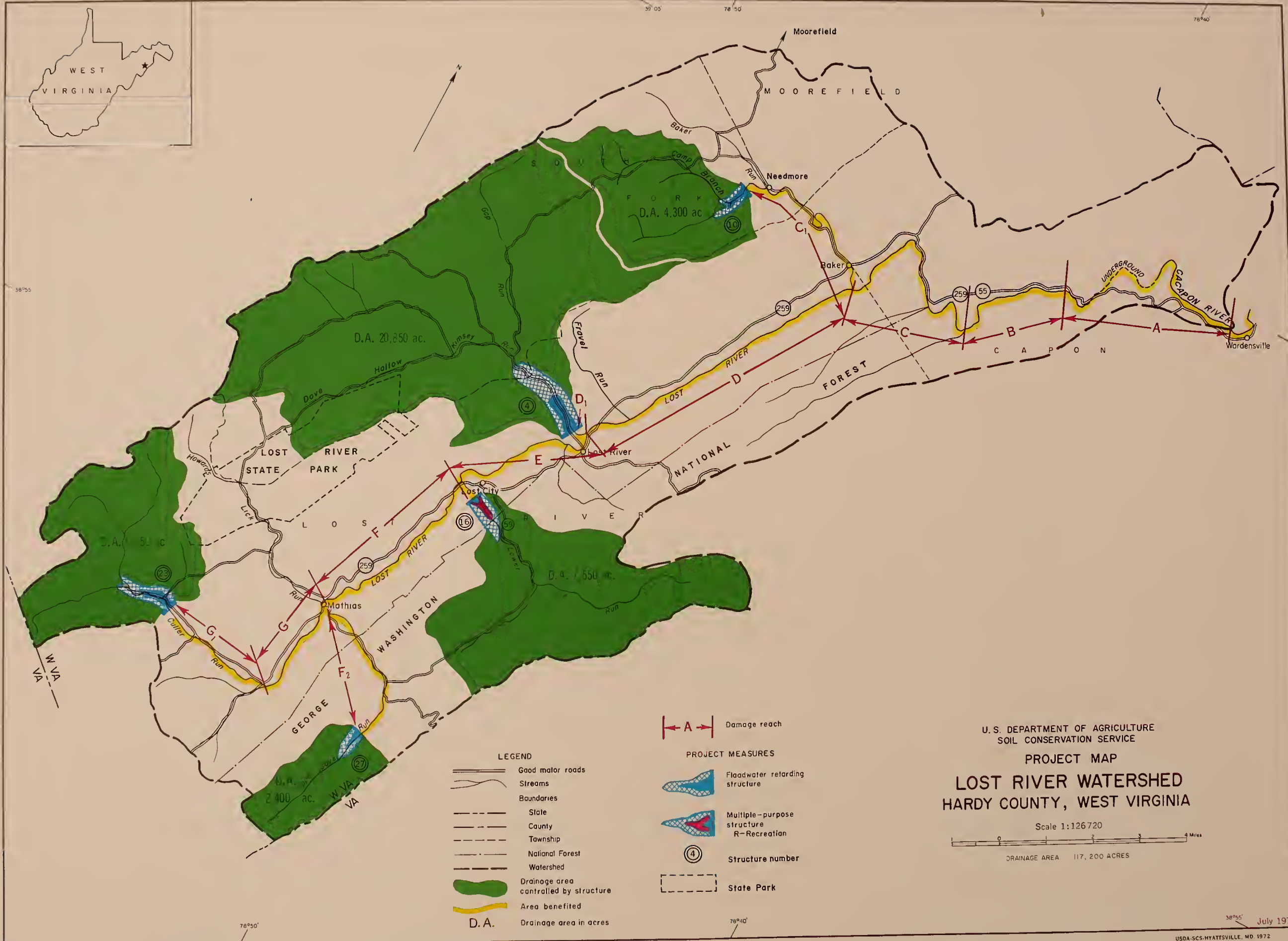
The speakers on the program reported on the progress thus far on surveys and preliminary planning of the Lost River Watershed and presented a plan which is economically feasible and appears acceptable by federal standards.

This project will be similar to projects already under construction in Mineral, Grant, and Pendleton counties.

For this system to become a reality, the support of the citizens in the Lost River Watershed area will be needed.

APPENDIX F

Project Map



- LEGEND**
- Good motor roads
 - Streams
 - Boundaries
 - State
 - County
 - Township
 - National Forest
 - Watershed
 - Drainage area controlled by structure
 - Area benefited
 - D.A. Drainage area in acres

- PROJECT MEASURES**
- Damage reach
 - Floodwater retarding structure
 - Multiple-purpose structure
 - R-Recreation
 - Structure number
 - State Park

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

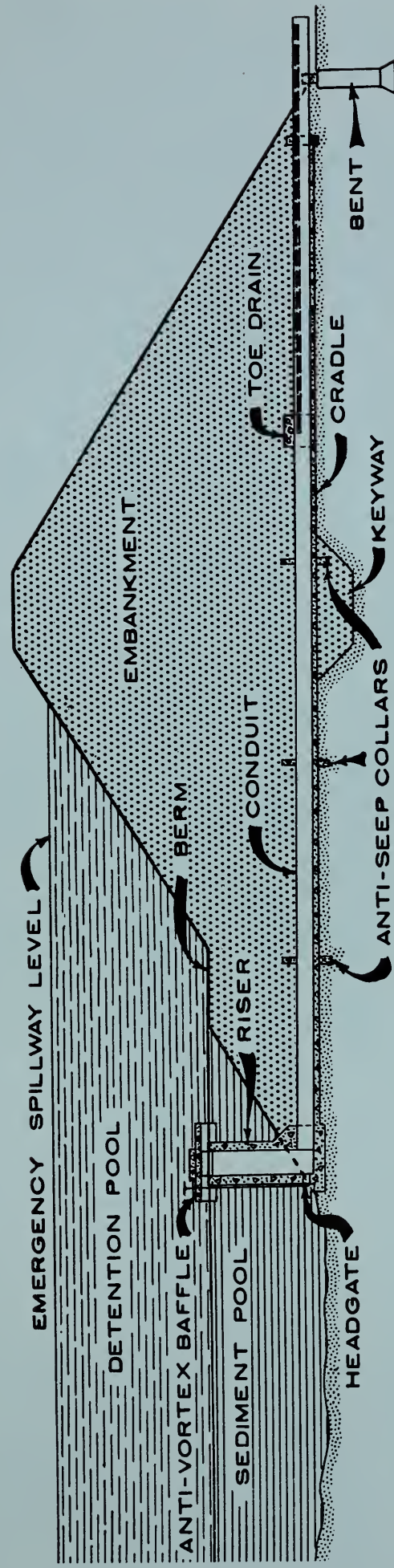
PROJECT MAP

LOST RIVER WATERSHED
HARDY COUNTY, WEST VIRGINIA

Scale 1:126 720

0 1 2 3 4 Miles

DRAINAGE AREA 117,200 ACRES



SECTION OF A TYPICAL FLOODWATER RETARDING STRUCTURE

